NOBLELIFT

CE

Service Manual

A series 2.0-3.8t Battery Counterweight Forklift

NOBLELIFT EQUIPMENT CO.,LTD

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Foreword

A series 2.0-3.8t battery counterweight forklift is a product independently developed by our company. The product has the characteristics of small turning radius, beautiful shape, compact structure, small volume, low center of gravity, good stability and superior performance.

This manual is about the correct use of A series 2.0-3.8t battery counterweight forklift instructions, guide you to safe operation and preventive maintenance, and help operators use the internal combustion forklift reasonably, so that the maximum efficiency of the internal combustion forklift! Relevant operators and maintenance personnel, be sure to read this manual before use. This manual is also applicable to container forklifts and forklifts equipped with accessories. Only trained and qualified personnel are allowed to service forklifts.

As our products continue to be updated and improved, you may have a product that is slightly different from some of the descriptions in this manual. If there is any confusion, please contact Nori Group sales company or agents.

This manual briefly introduces the technical parameters of our company's counterweight forklift, the structure, working principle of each main component, and the requirements and contents of operation, maintenance and maintenance. Please strictly abide by the provisions and precautions in this manual, careful driving, careful operation, careful use, so that your forklift truck in the best working condition for a long time, play the maximum efficiency. When you rent or transfer the forklift, please rent or transfer this manual with the vehicle.

In order to stand out, this manual USES the following icon:

1. ⃠ — Indicates a potentially hazardous condition that, if not avoided, could result in serious injury to the person, serious damage to the vehicle, or fire.

2. ⚠ ---- Indicates a potentially hazardous condition that, if not avoided, may result in medium-to-minor injury to the human body or partial damage to the vehicle.

3. ☞ ---- General precautions and instructions when using.

⚠ Most of this product is made of recyclable steel, and the waste generated in the process of use, maintenance, cleaning and disassembly must be recycled and disposed of pollution-free in accordance with local regulations. The recycling of these wastes must be done by professionals in designated areas, such as hydraulic oil, batteries and electronic equipment waste, if not properly disposed of, can cause harm to the environment and human health. The product recall service shall be implemented in case of batch problems.

Directory

1.Vehicle overall Introduction

1.1 Appearance and main components

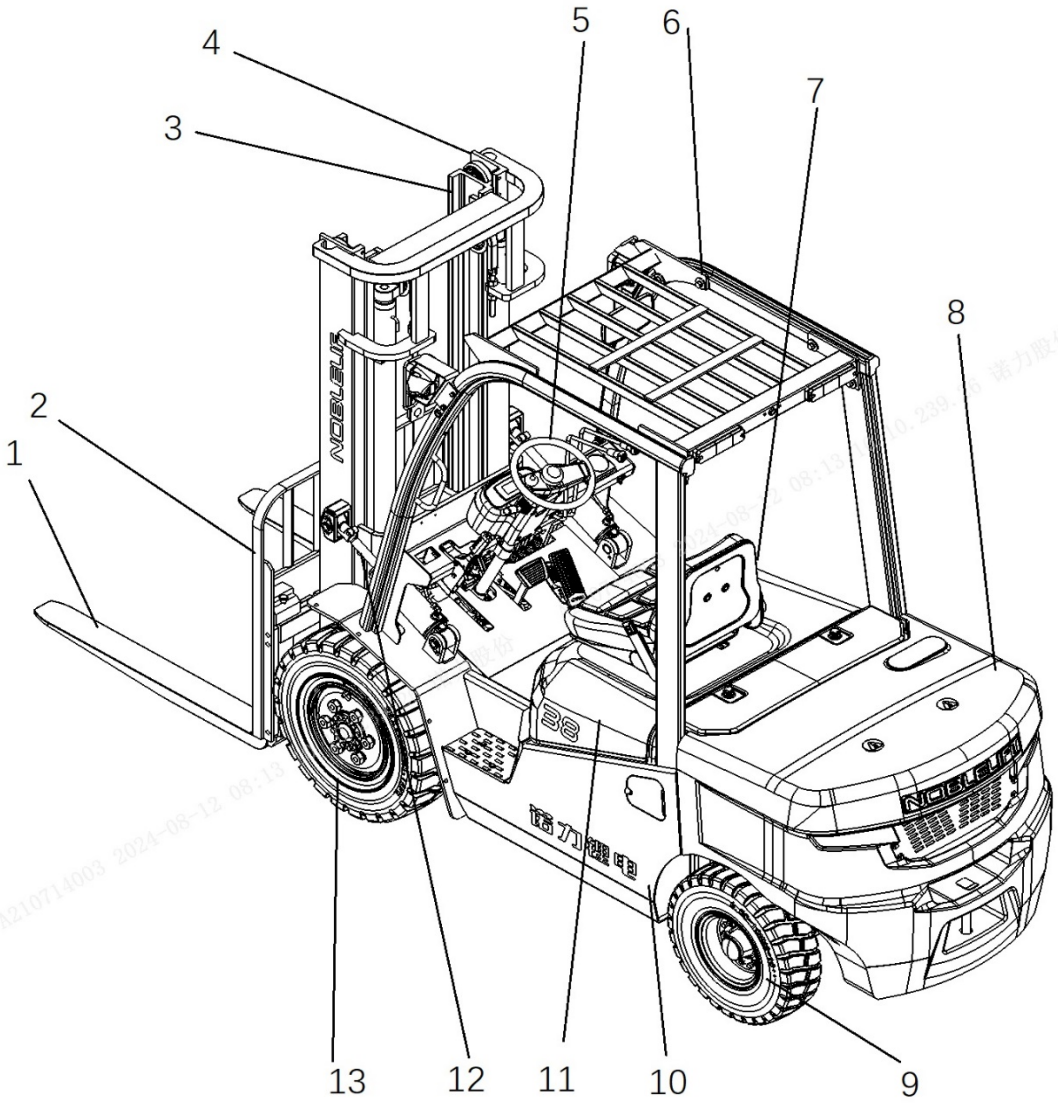
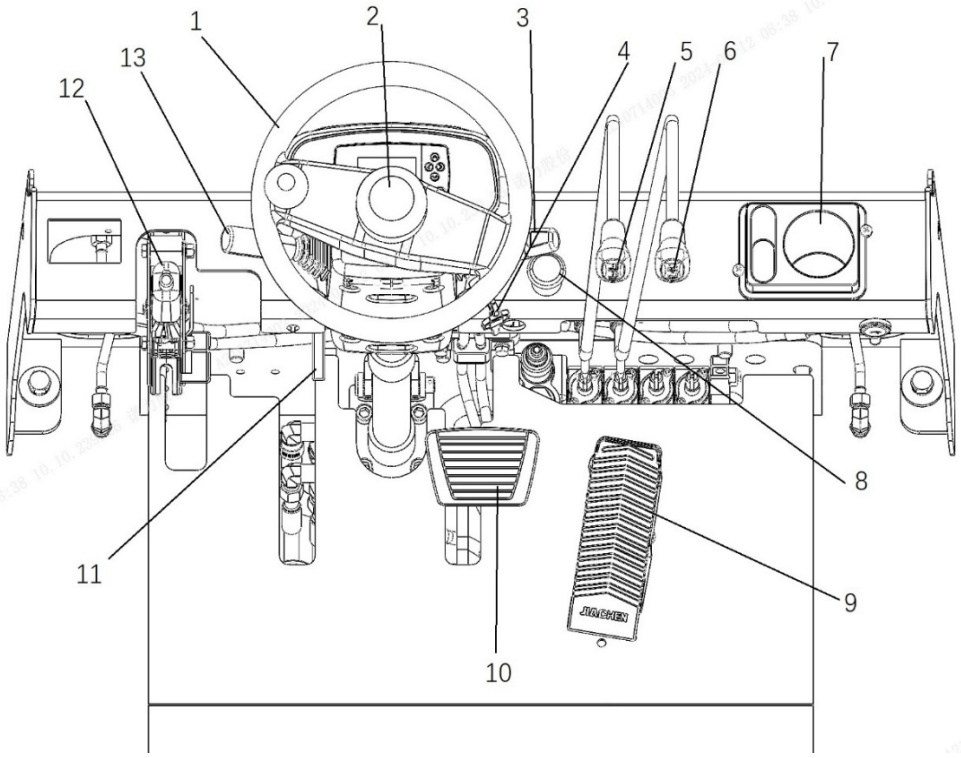


Fig.1 Overview of main components

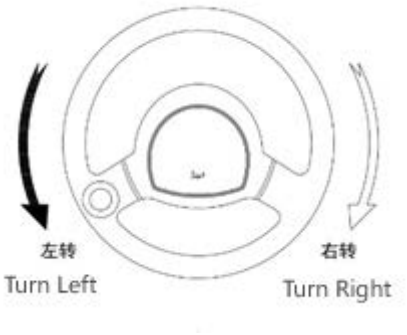
1.Forks 2.Rack stopping 3.Internal mast 4. External mast 5. Steering wheel 6. Overhead guard 7.Seats 8. Balance weights 9. Rear wheels(turning wheels) 10.Frame 11.Hood 12.Tilt cylinder 13. Front wheels (Drive wheels)

1.2 Descriptions of the display and operation components



1.Steering wheel 2.Horn 3.Modular switch 4.Key Switch 5、Lifting joystick 6.Tilt joystick 7. Cup holder 8. Emergency power-off switch 9. Accelerator pedal 10. Brake pedal 11. Steering wheel adjustment switch 12. Hand brake handle 13. Forward and backward switch

Steering Wheel [1]



Control the direction of the forklift.

The steering wheel rotates to the right and the forklift will turn to the right; The steering wheel rotates to the left and the forklift turns to the left. The rear of the truck can swing outward.

Warning

The forklift uses full hydraulic steering, so steering is difficult when the oil pump motor is stopped. To turn again, the oil pump motor must be started immediately.

Horn button [2]

Press the horn button in the center of the steering wheel and the horn will sound.

Modular light switches [3]

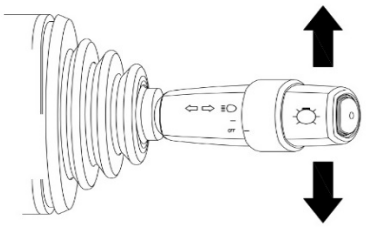
This modular switch includes a turn signal switch and a light switch.

Turn signal switch: When you turn this switch back and forth, the corresponding left and right turn signal indicators will be flashed.

Toggle Forward	⇦	The left turn signal flashes
Neutral		OFF
Toggle Backward	⇨	The right turn signal flashes

Attention

The turn signal switch does not automatically return to the neutral position and needs to be reset manually.

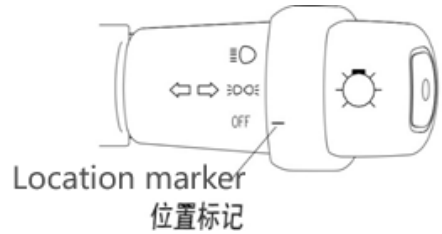


Light switch:

Rotary two-speed switch. The opening and closing of the light can be controlled by rotating the knob of the switch head.

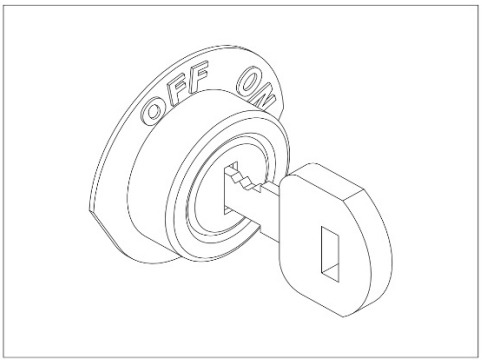
X: Indicates that it is on

Contact symbol	Light symbol	Small head-lights	Huge head-lights	Width Indica-tor light
—	≡D		X	X
	—	X		X
	OFF			



To turn on the small headlights, huge headlights, and width indicator lights, turn this switch and align the position line on the switch handle with the corresponding mark on the switch body.

Key Switch [4]



Turn on and off the control current. Removing the key ensures that the forklift does not start accidentally.

The key switch has two positions, on/off, first set the reversing lever to the neutral position, relax the accelerator pedal, and then turn the key clockwise to the "ON" position.

Attention

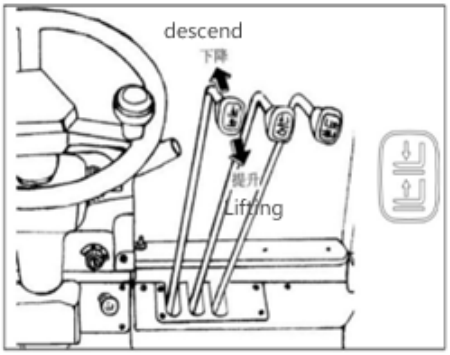
①If the reversing lever is not in the center position or the accelerator pedal has been depressed, the key switch to the "ON" position will not make the forklift run.

② There may be a fault code at this point, please don't worry.

③ The reversing lever returns to the neutral position and the foot is removed from the accelerator pedal before the truck can be started.

④ At this time, the fault code will also disappear.

Lifting joystick [5]

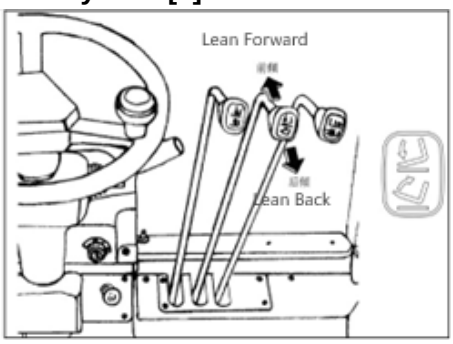


For raising or lowering racks.

Push forward - descend; Pull back - ascend

The lifting speed is controlled by the handle backward tilt angle. The lowering speed is controlled only by the handle forward tilt angle.

Tilt Joystick [6]



Used for forward and backward tilting of the mast.

Push forward – lean forward;

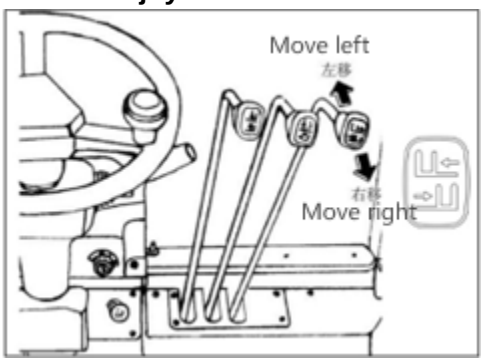
Pull back – lean back.

The tilt speed depends on the tilt angle of the handle.

Attention

The multi-way valve is equipped with a forward tilt self-locking valve. When the circuit is closed, the mast cannot tilt forward even if the tilt handle is pushed forward.

Side shift joystick



Push forward – move left

Push back – move right

For left and right movement of the side shift rack.

The speed of the side shift is determined by the tilt angle of the handle.

Attachment joystick

It can be a side shift joystick, a rotation joystick or other attachment joystick, depending on the specific situation.

Cup holder [7]

Placed on the right side of the instrument frame, a cup holder is set for the driver to place the cup.

Emergency power off switch [8]

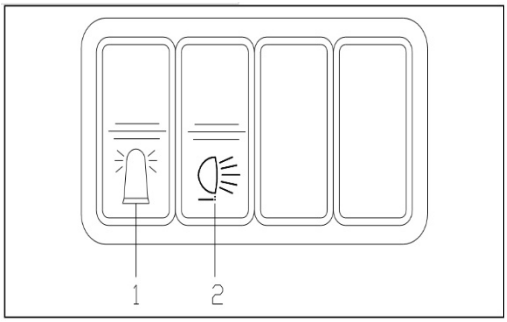
Turn the power on or off.

In case of emergency, press the red mushroom button to cut off the main power of the vehicle. No moving, steering or lifting.

Attention

Please do not use the emergency stop button to replace the key switch.

Rocker switch [optional]



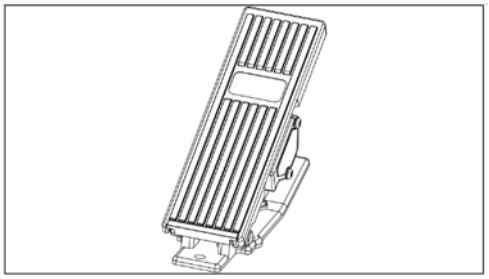
The rocker switch is for the warning light and rear headlight, the left side is the warning light and the right side is the rear headlight.

1. Alarm light switch: press down, the alarm light flashes; Press up, the alarm light goes out.
2. Rear headlight switch: press down, rear headlight on; Press up, and the rear headlights will go off.

Symbol	component
	Warning lights
	Rear headlights

Attention

Whether this light is on or off has nothing to do with the key switch position, so be careful not to forget to turn off the light.



The forklift's travel speed can be adjusted steplessly.

Slowly press the accelerator pedal, the operating motor starts to run, and the forklift starts to start. The travel speed can be adjusted steplessly according to the pedal force.

Accelerator pedal[9]

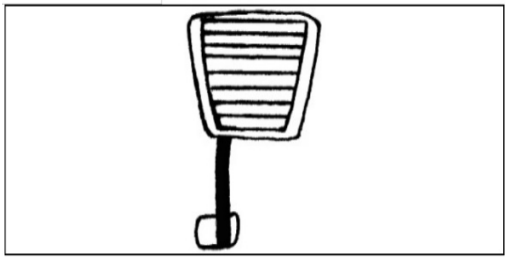
Attention

When the vehicle is running, release the accelerator pedal to achieve soft braking.

Warning

Before turning on the key switch, do not step on the accelerator pedal, otherwise the instrument display will show a fault. At this time, the accelerator pedal must be released.

Brake pedal[10]

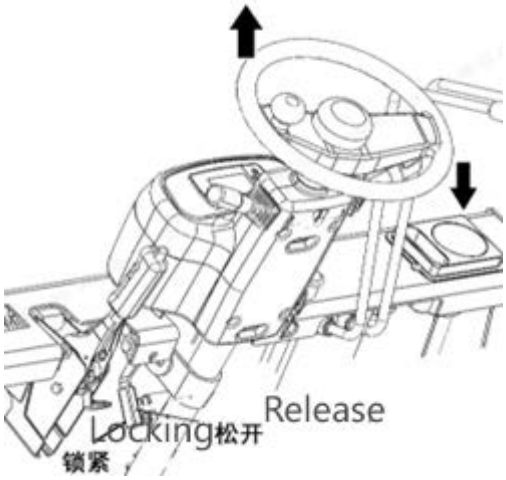


Press the brake pedal to slow down the vehicle, press it all the way down to stop the vehicle, release the pedal and the vehicle will move.

Attention

Avoid sudden braking. Sudden braking can easily cause the vehicle to overturn or the cargo to fall, leading to safety accidents.

Steering wheel tilt adjustment lever[11]



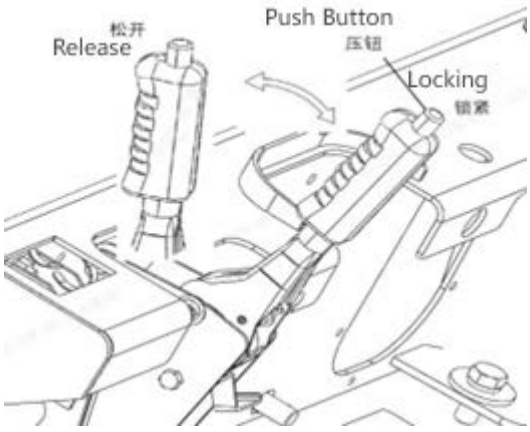
The position of the steering wheel can be adjusted by pulling up the adjustment lever on the left side of the steering column, moving the steering wheel to the desired position, and then pushing the adjustment lever down to lock it.

Attention

a. The steering wheel angle can only be adjusted after the forklift stops and the handbrake handle is pulled.

b. After adjustment, move the steering wheel up and down to make sure it is locked.

Handbrake handle[12]



Pull the handle back to tighten it, and push the handle forward to loosen it. The handle must be tightened before the operator leaves the forklift.

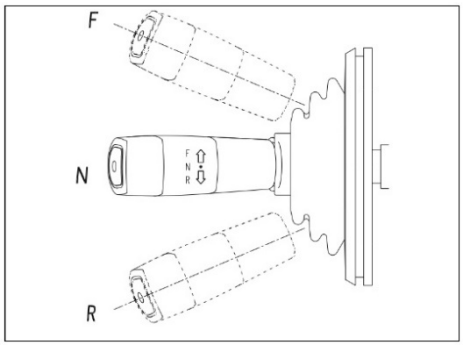
Attention

When the vehicle's brake system fails or an emergency occurs, you can pull this handle to achieve emergency braking. It is strictly forbidden to use the handbrake to achieve driving braking.

Reversing joystick[13]

The reversing joystick is installed on the left side of the steering column.

F	Forward gear
N	Neutral gear
R	Reverse gear



Before changing the direction of travel, press the brake pedal to stop the vehicle completely, and then move the joystick forward to the forward gear. If you need to go backward, press the brake pedal to slow down the vehicle, and move the joystick backward to the reverse gear.

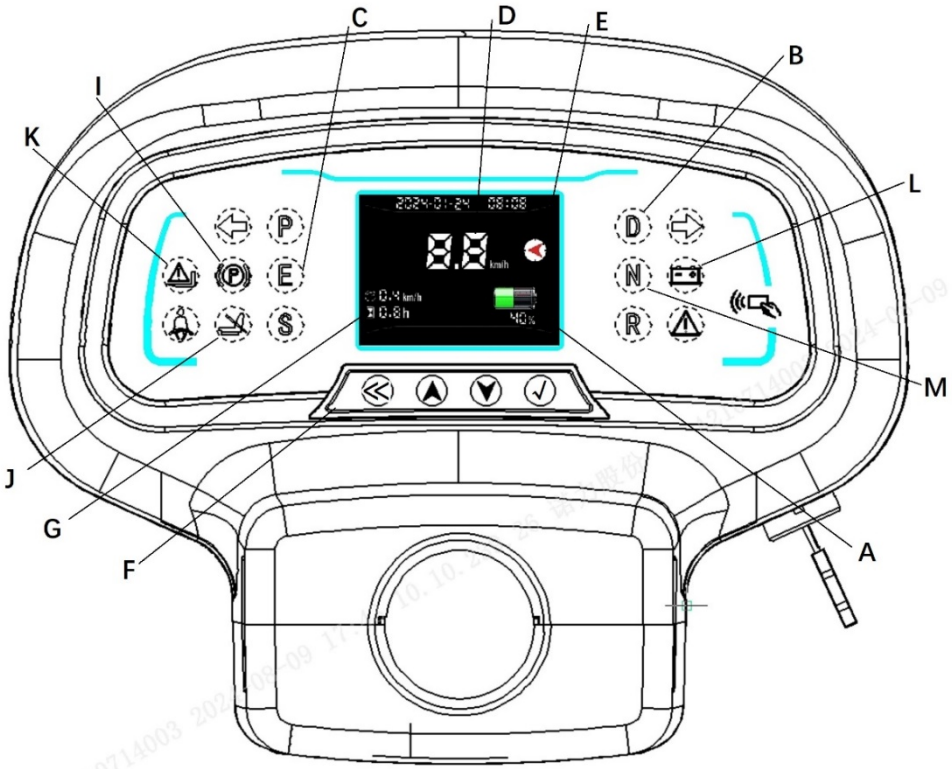
Attention:

The forklift can only be started when the joystick is in the neutral position.

1.3 Display Instruments

The DZB993-NL instrument is a digital combination instrument with full-color LCD display. The instrument uses a 2.8-inch industrial-grade, high-brightness color TFT LCD screen as a display, with clear display. It uses a 32-bit ARM7 core CortexM3 core main control chip. 28-core AMP connector, reliable connection;

The instrument's operating voltage is: +9~+32V adaptive; its operating temperature is: -30°C~+65°C; it has 1 CAN communication interface and multiple switch and analog input ports.



No.	Display	No.	Display
A	Current battery level	G	Digital display of the current vehicle's cumulative working time, 5-digit display. When the key switch is turned on and the vehicle starts working, the working timer starts timing.
B	Whether the vehicle is moving forward or backward. It is not displayed when the vehicle is in neutral.	I	Handbrake light: lights up when the driver applies the handbrake

C	Current working mode: "S", "P", "E" 3 working modes	J	Seat light: turns on when the driver leaves the seat
D	Current vehicle speed, in km/h or MPH	K	Lift lock light: When the battery power is less than or equal to 10%, the lift lock light will light up.
E	The arrow indicates the direction of travel of the steering wheel	L	Battery light: lights up when the battery level is less than or equal to 20%
F	Menu key	M	Neutral light: lights up when the vehicle is in neutral gear

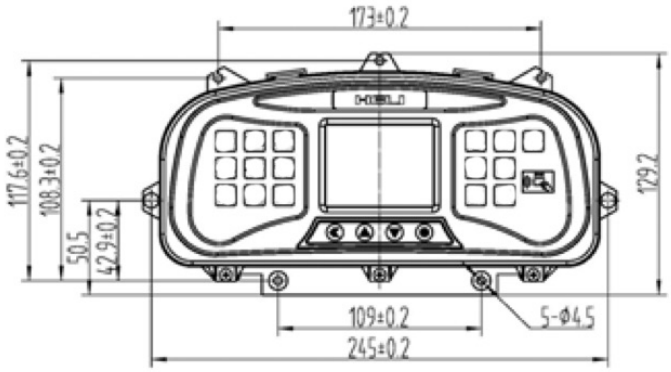


Fig Instrument front view

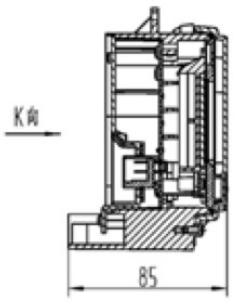


Fig instrument side view

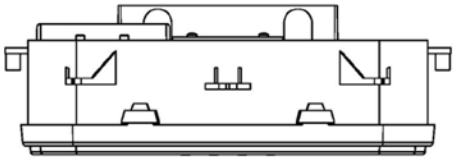


Fig instrument bottom view

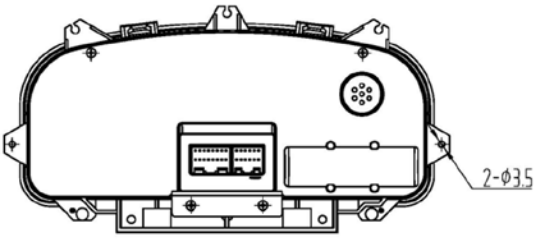
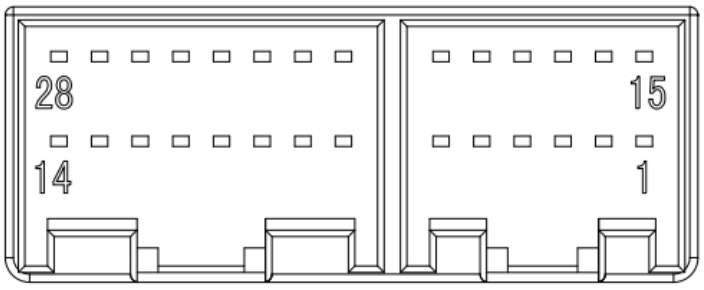


Fig Instrument back view

The DZB993-NL forklift instrument cluster uses the 28-pin AMP174979-2 connector.



Terminal No.	Function Definition	Terminal No.	Function Definition	Terminal No.	Function Definition
1	5v power out put	11	Turn left (+)	21	-
2	-	12	-	22	-
3	-	13	-	23	Seat indication (-)
4	-	14	Instrument power positive	24	-
5	Vehicle speed alarm control output (-)	15	CAN-H	25	-
6	-	16	CAN-L	26	-
7	Negative pole of power supply	17	-	27	Switch signal
8	-	18	-	28	seat belt (-)
9	-	19	-		
10	Turn left	20			

Menu button

Symbol	Name	Function
	UP	Move the cursor up, or add 1 to the selected number;
	DOWN	Move the cursor down, or reduce the selected number by 1;
	CANCEL	Cancel the current content or return to the previous menu;
	CONFIRM	Confirm the current operation and enter the menu mode in the main interface;

1.3.1 Oil pump motor description

MENU	DESCRIPTION	MARK
Maximum speed of tilt function		rpm
Auxiliary function 2 maximum speed		rpm
Auxiliary function 3 maximum speed		rpm
Auxiliary function 4 maximum speed		rpm
Maximum allowable speed of the oil pump motor in case of failure		rpm
Oil pump motor overtemperature torque limit point		℃
Oil pump motor overtemperature cut-off point		℃
Oil pump motor fan (speed regulation) starting temperature		℃
Oil pump motor fan (speed regulation) maximum speed temperature		℃
Lifting control	Oil pump motor lifting related function settings	
Steering control	Oil pump motor lifting related function settings	

1. 3. 2 List and description of main interface parameters

Home page interface parameter list and description			
menu		description	mark
1	Seat switch	traction-seat switch status	ON/OFF
2	Forward switch	traction-forward switch status	ON/OFF
3	Back switch	traction-back switch status	ON/OFF
4	Parking switch	traction-handbrake switch status	ON/OFF
5	Brake pedal switch	traction-foot brake switch status	ON/OFF
6	P mode	traction-Mode P State	
7	S mode	traction-Mode S State	
8	Lifting switch	Oil pump-lift switch status	ON/OFF
9	Tilt switch	Oil pump-tilt switch status	ON/OFF
10	Side shift switch	Oil pump-side shift switch status	ON/OFF
11	Attachment switch	Oil pump-accessory switch status	ON/OFF
12	Steering potentiometer	traction-Current rear wheel steering angle	
13	Lifting potentiometer	Oil pump-current lifting potentiometer output value	
14	Accelerator pedal switch	traction-Accelerator pedal switch status	ON/OFF
15	Accelerator analog input	traction-accelerator pedal analog sampling value	
16	KSI Voltage	Current key voltage value	V
17	Traction motor temperature	Current travel motor temperature	℃
18	Traction drive module temperature	Current travel drive module temperature	℃
19	Pump motor temperature	Current oil pump motor temperature	℃
20	Pump drive temperature	Current oil pump drive module temperature	℃
21	Card swipe status	Is the card currently swiped?	
22	accelerator	Current accelerator travel	
23	Traction motor speed command	Current traction drive module set speed	Rpm
24	Current speed of traction motor	Current actual speed of the traction motor	Rpm
25	Oil pump motor speed command	The current oil pump drive module set speed	Rpm
26	Current speed of oil pump motor	Current actual speed of the oil pump motor	Rpm
27	SOC	Current battery level	%
28	UDC voltage value	Current busbar copper bar voltage value	V

29	Speed	Current vehicle speed	KM/H
30	Total KSI time	Current boot time	H
31	Total mileage	Current vehicle total mileage	KM
32	Lithium battery pack discharge current	Current battery current	A
33	Traction motor running time	Current traction motor running time	H
34	Oil pump motor running time	Current oil pump motor running time	H
35	Interlock 1	Current seat switch status	ON/OFF
36	Traction PHA	Traction motor phase A status	
37	Traction PHB	Traction motor phase B status	
38	Oil pump PHA	Oil pump motor phase A status	
39	Oil pump PHB	Oil pump motor phase B status	

1.3.3 Calibration - Battery Pack List and Description

Calibration - Battery Pack List and Description			
Menu		description	mark
1	Bus/battery undervoltage cut-off point	When the bus or battery undervoltage reaches the set value, the controller automatically cuts off	V
2	Undervoltage warning point	When the battery power reaches the set value, the controller will warn	%
3	Undervoltage alarm point	When the battery power reaches the set value, the controller will warn	%
4	Battery Pack	Lead-acid battery BDI setting parameters	
5	Lithium battery pack	Lithium battery communication settings	

1.3,4 Calibration-Traction Motor Interface Parameter List and Description

Calibration-Traction Motor Interface Parameter List and Description			
menu		description	mark
1	Traction motor first acceleration speed function activated		ON/OFF
2	Traction motor first acceleration speed		Rpm
3	Traction motor first acceleration		rpm/s
4	Accelerator partial release deceleration		rpm/s
5	Reversing deceleration	Deceleration when switching between forward and reverse gears	rpm/s

6	Traction motor first braking speed function activated		ON/OFF
7	Traction motor first braking deceleration		rpm/s
8	Traction motor first braking speed		Rpm
9	Slow Mode	Controller speed mode switching	ON/OFF
10	SOC to traction limitation	Different traction motor modes at different power levels	ON/OFF
11	Traction motor over-temperature torque limit point	When the traction motor reaches the set temperature value, the torque is limited	℃
12	Traction motor overtemperature cut-off point	When the traction motor reaches the set temperature value, the motor stops	℃
13	Traction motor fan (speed regulation) starting temperature	When the temperature of the traction motor module reaches the set value, the fan starts	℃
14	Traction motor fan (speed regulation) maximum speed temperature	When the temperature of the traction motor module reaches the set value, the fan reaches the maximum speed	℃
15	accelerator	Accelerator parameter setting	
16	Manipulability		
17	Brake pedal	Brake pedal parameter setting	
18	Speed limit on curves	Turning process related parameter settings	
19	Speeding warning		
20	Hill control	Parameter setting of the vehicle on a slope	

1.3.5 Calibration-Gear Mode Interface Parameter List and Description

Calibration-Gear Mode Interface Parameter List and Description			
Menu		Description	Mark
1	Current gear mode	The current gear mode of the vehicle	
2	How to modify the gear mode		
3	Speed zone	Traction motor speed partition value	
4	P gear mode		
5	S gear mode		
6	Traction motor deceleration		
7	Traction motor output current		
8	Oil pump motor output current		
9	Oil pump motor acceleration and deceleration rate		

1.3.6 Calibration-Vehicle Information Interface Parameter List and Description

Calibration-Vehicle Information Interface Parameter List and Description			
Menu		Description	Mark
1	Restore system defaults		
2	Total mileage		km
3	Contactor pickup delay waiting time		S
4	Delay time for activating slow mode for heavy load lifting		S
5	Tire diameter	Current tire diameter of the vehicle	mm
6	Gearbox reduction ratio	Current reduction ratio of the vehicle	
7	Enable settings	Vehicle parameter setting	
8	Interlock switch		
9	High limit switch		
10	Power output disconnection detection parameter group		
11	Motor encoder parameters		

1.3.7 Calibration-auxiliary functions + communication + system parameter interface parameter list and description

Calibration-auxiliary functions + communication + system parameter interface parameter list and description			
Menu		Description	Mark
1	Lease & Password Function		
2	BSD alarm speed limit function		
3	Remote communication		
4	Library version	Version Information	

The multi-function display can show the battery power, running hours, running mode, running speed, fault information, steering angle, etc. It can also display various warning information in a graphical way. You can also view the fault code through the button on the right.

Battery charge indicator [A]

Displays the remaining battery capacity as a percentage.

Attention

It is important to charge the battery in time, otherwise it will affect the battery life!

Operating hours display [G]

When the vehicle key switch is turned on, the hour meter starts timing with a minimum resolution of 1 hour.

operation mode display[C]

As shown in the figure, from top to bottom they represent ◊P **Mode** **Mode** ◊E **Mode** S。

S **Mode**, P **Mode**：

Power mode is suitable for long-distance transportation and occasions that require greater power or speed.

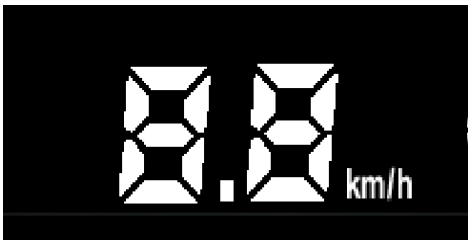
E **Mode**：In economic mode, all parameters are optimized to save power. It is suitable for situations where a single charge can last for a long time. It is recommended to work in this mode at ordinary times.

Attention

The system defaults to P mode. After each power failure, the system will return to P mode regardless of the mode before the power failure.

Running speed or fault display [D]

Running speed display



When working normally, it displays the vehicle's running speed.

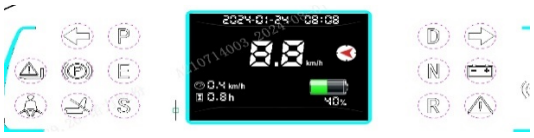
Fault display

When a fault occurs, the system will automatically switch to the fault interface to display the fault code and analysis instructions.

Rear wheel angle display [E]

Indicates the rear wheel angle in real time. The pointer will rotate with the change of the rear wheel angle. The rear wheel angle changes from +90° to -90°. The position shown in the figure is the position of the pointer when the rear wheel is at -90°.

Indicator lights



Turtle speed light [N]

Neutral light [M]

Lights up when the vehicle is in neutral

Low battery indicator [L]

When the battery level is below 20%, the light comes on to remind the user to charge the battery as soon as possible.

Lift lock light[K]

When the battery level is only 10%, the light will be on and the mast lifting speed will be reduced to remind the user to charge the battery as soon as possible.

Seat light[J]

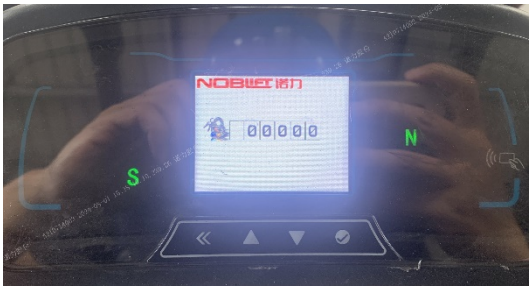
When a person leaves the seat, the light will come on, indicating that the seat switch is disconnected and the vehicle cannot move or rise. This function requires the installation of a seat with a seat switch.

Handbrake light[K]

This indicator light comes on when the parking brake is applied.

Procedure

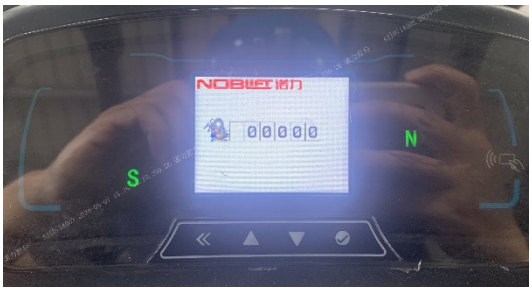
Start the machine and enter the instrument interface:



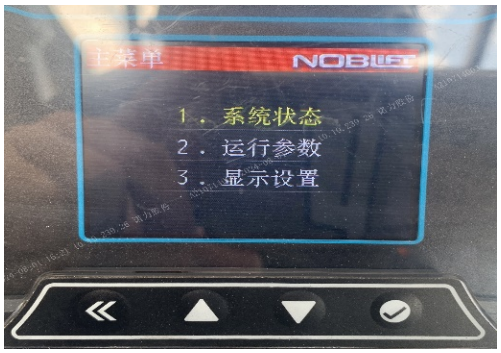
In the main interface, there are three corresponding operating modes: S, P, and E.

Action Menu

Enter the password input interface

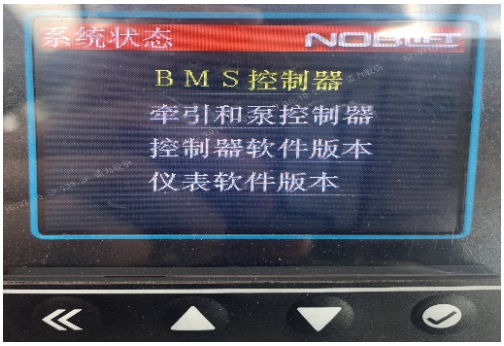


Enter the password and press  , then press  to enter the main menu interface



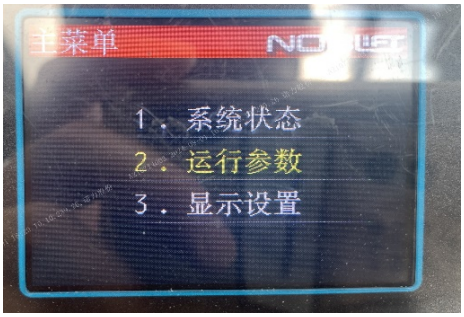
系统状态	System status
运行参数	Running configuration
显示设置	Display settings

Press  to enter the system status interface.



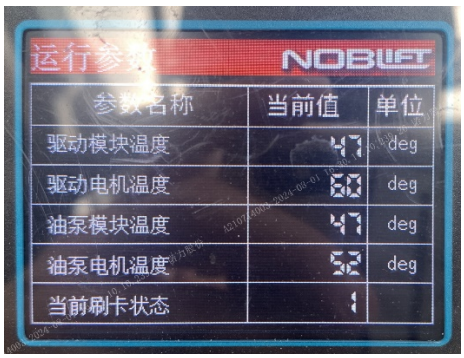
BMS 控制器	BMS controller
牵引和泵控制器	Traction and pump controller
控制器软件版本	Controller software version
仪表软件版本	Panel software version

Press to enter the operation parameter interface



系统状态	System status
运行参数	Running configuration
显示设置	Display setting

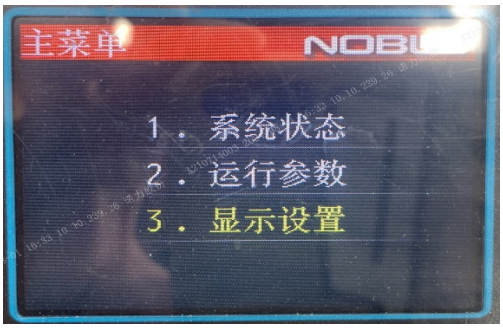
Press to enter the operation parameter interface



运行参数 running configuration		
参数名称 configuration	当前值 Current value	单位 unit
驱动模块温度 Drive module temperature	47	Deg
驱动电机温度 Drive motor temperature	60	deg
油泵模块温度 Oil pump module temperature	47	deg
油泵电机温度 Oil pump motor temperature	52	deg
当前刷卡状态 Current swipe status	1	

Check the forklift's operating conditions and related temperatures as shown in the figure.

Press to enter the operation parameter interface

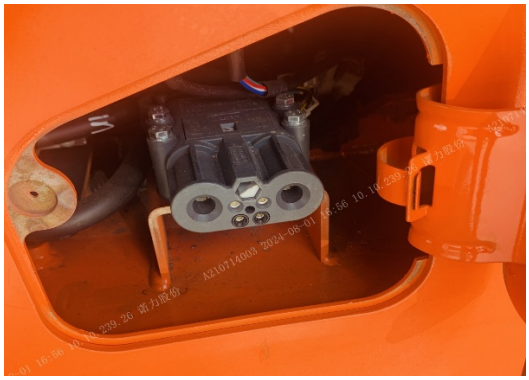


系统状态	System status
运行参数	Runing configuration
显示设置	Display setting

After viewing, press the key to return to the main menu interface

1. 4 Lithium battery charging port structure

CPD20/25-AF1H,CPD30/35/38-AF1S, CPD30/35/38- AF2HLithium battery charging port structure



The charging port is moved to the right rear of the vehicle body. The charging door assembly uses magnets to close, making it very convenient to open and charge.

Lithium battery fastening:

The lithium battery is fixed by the bottom fixing bolts, clamping the frame to achieve the purpose of tightening. When tightening the bolts clockwise, the lithium battery is installed firmly in the horizontal direction.

1.5 Battery replacement and installation

The battery is sunk to the bottom of the vehicle body and is supported on the frame by its weight.

When the forklift is used continuously for a working cycle and the battery is completely exhausted, the battery on the original forklift should be replaced with another set of fully charged batteries in time, and the replaced battery should be charged.

Attention

When replacing the battery, make sure that the battery matches the forklift. Using an incompatible battery will shorten the forklift's operating time or cause the forklift to tip over while driving.

Battery replacement should be carried out on the platform.

Follow the steps below to replace the battery:

- - When using another forklift as a lifting device for replacing the battery, appropriate lifting gear (attachments) should be used.

- Lifting batteries should be performed by professionals.

① Open the battery cover.

② Unplug the battery.

A gas spring or other means is used to ensure that the battery cover is locked to prevent the battery cover from falling and injuring people or objects.

③ When lifting the battery out of the forklift, be careful not to damage the steering wheel or other forklift parts.

④ After placing a set of fully charged batteries, the battery plug should be securely connected.

⑤ Replace the battery cover.

- When replacing the battery cover, be careful not to press your fingers.

- When lifting the battery, be careful to prevent the battery box from swinging and damaging the vehicle body.

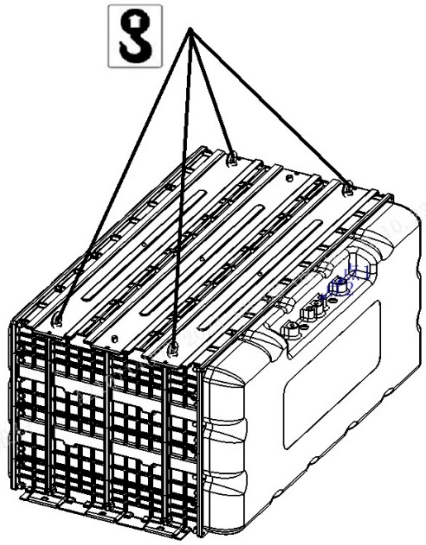
Installation is the opposite of removal.

Installation

Installation is the opposite of removal.

Attention

Be careful when lifting. The battery weighs about 210kg, which is very heavy. During the installation process, avoid crushing your feet or pinching your hands.

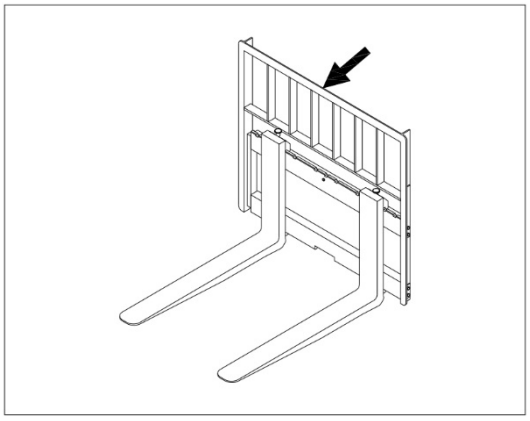


Use a lifting device to lift the battery to the ground. The fixing points are shown in the figure above.

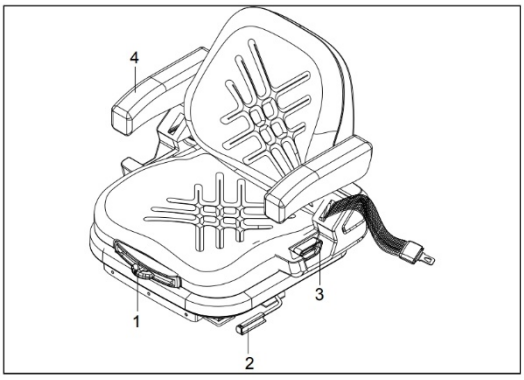
1.6 Vehicle body and others

Rack stopping

The backrest shelf ensures that the goods are loaded smoothly. It is strictly forbidden to use a forklift without a backrest shelf. It is forbidden to dismantle or modify the backrest shelf.



Seat (optional)



1. Seat weight adjustment handle
2. Seat front and rear adjustment handle
3. Backrest angle adjustment handle
4. Armrest adjustment knob

·Seat weight adjustment

According to the user's own weight, lift the weight adjustment handle upwards, then adjust the weight horizontally to the corresponding weight position until it feels comfortable.

·Seat front and rear adjustment

Move the adjustment handle inwards by hand, then push the entire seat forward and backward to reach the ideal position, and lower the handle to lock it automatically.

Backrest angle adjustment

Sit on the seat with your back against the seat back, then use your left hand to pull the backrest angle adjustment handle upwards, lean forward or backward, and release the handle when the backrest angle reaches a satisfactory position.

·Gauntlet Adjustment

The inclination angle of the armrest can be adjusted by turning the adjustment knob. When the knob is turned outward, the front end of the armrest will rise. When the knob is turned inward, the front end of the armrest will lower.

Attention

① Before adjusting the seat, the key switch must be turned off.
② The seat position can only be adjusted when the forklift is stopped.
③ It is not allowed to adjust the seat during driving to avoid accidents.
④ For front and rear adjustment and backrest angle adjustment, the handle should be pulled into place to ensure that the structure is completely disengaged before adjustment
⑤ After the adjustment is completed, each handle should be returned to its position. Before using the forklift, ensure that all parts are locked reliably.

seat belt

·Fasten your seat belt

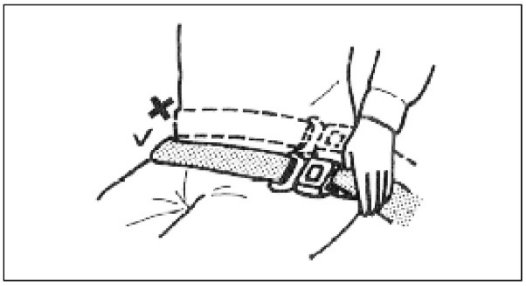
The seat belt is retracted in the box, and an auxiliary action is required before pulling out the seat belt, so you may encounter some troubles if you are not familiar with it.

One type of seat: You need to press down the white round button (with the font

press to release) with one hand, and then pull out the seat belt with the other hand. Then insert it into the socket on the other side of the seat.

You may also encounter another type of seat: a seat with a rotating seat belt box. If you turn the seat belt box forward, the seat belt cannot be pulled out; if you turn it backward, you can pull out the seat belt. After pulling it out, insert it into the socket on the other side of the seat. You must turn the seat belt box forward again. At this time, the seat belt is in the normal working position.

When getting in the car and fastening the seat belt, the back and waist of the human body should be as close to the seat as possible. Do not wear the seat belt on the abdomen.

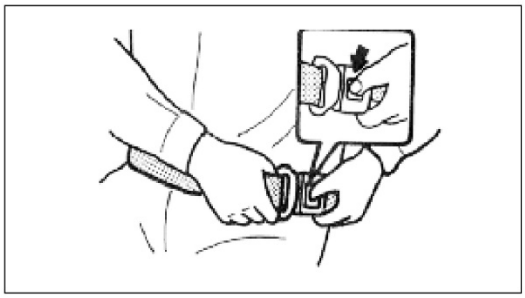


Do not let the seat back tilt too much, otherwise the seat belt will not extend correctly.

Do not use the belt in a knot or twist.

Fastening the seat belt in daily operation can ensure that you can protect yourself and reduce injuries when the vehicle rolls over.

・Unfasten your seat belt



Use your left thumb to press the red button (with the word PRESS) on the socket to release it.

・Check seat belts

Check the bolts that secure the seat belt regularly to see if they are loose. Do not let the seat belt press against hard or fragile objects, or rub against sharp blades to avoid damage.

The various parts of the seat belt must not be removed at will. Frequently used belts should be inspected for appearance regularly.

① Cutting or cracking;

② Wear or damage to metal parts, including positioning points;

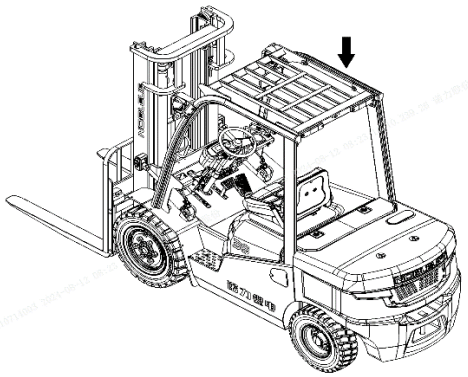
③ Failure of buckles or tractors;

④ Derailment.

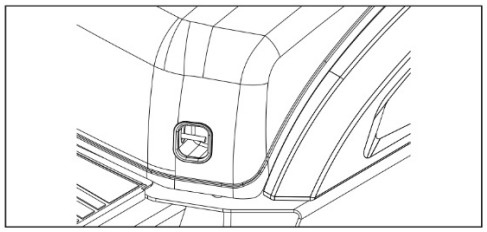
If any abnormality is found, the belt should be replaced with a new one immediately. The belt has a service life of 3 years and should be scrapped in advance if any abnormality is found.

Overhead guard

The overhead guard protects the operator from falling objects. It must have sufficient impact resistance. It is strictly forbidden to use a forklift without a guard. Tighten the overhead guard regularly.

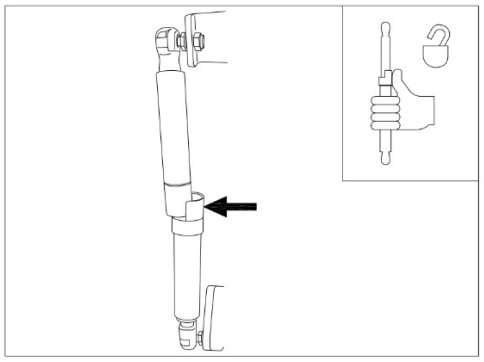


Locking components



To prevent the hood from being opened at will, the car is equipped with a lock assembly. To open the hood, you must first forcefully pull the lock assembly handle. At this time, the hood is released.

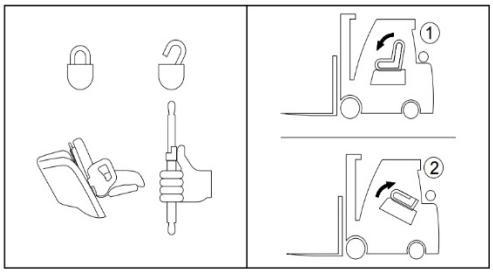
Gas springs



When the cover is open, use it to support the cover. When closing the cover, press the red button in the direction of the arrow in the figure while pressing the cover down firmly.

Hood

The hood has a wide opening for easy maintenance and service. With the help of the gas spring force inside the hood, it can be fully opened upwards with very little force.



When closing, press the red button on the gas spring cylinder, then the lock will be released, press the head of the hood down to close it, and when you hear a "click" sound, it means the hood is locked.

Attention

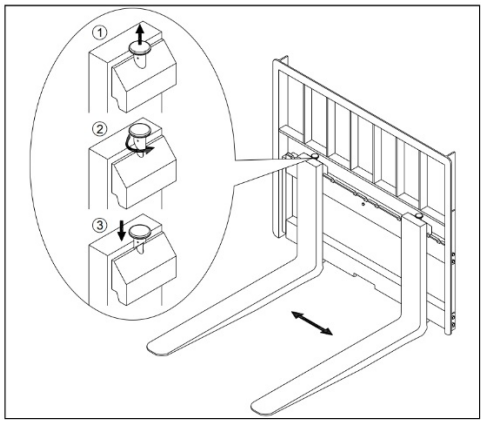
When closing the hood, prevent your fingers from being pinched by the falling hood.

Warning

When performing maintenance under the hood, be sure to turn off the key switch to prevent electric shock. However, if your hands, feet, head, and body do not touch the components, you may turn on the key switch and open the hood to diagnose the fault by hearing.

Fork positioning pin

Used to adjust the distance between forks. Pull up the fork positioning pin, rotate 180°, and adjust the forks to the required position according to the goods to be loaded and unloaded.



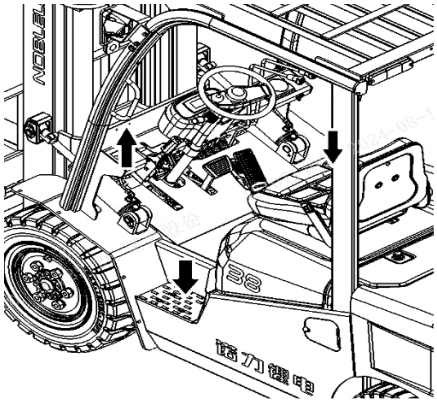
Attention

The spacing adjustment of the forks should be based on the center line of the forklift, and should be symmetrical. After adjustment, the fork positioning pins must be locked. There is an opening on the lower crossbeam of the fork frame for loading and unloading forks. It is forbidden to use forks in the opening position to prevent the forks from falling

off from the opening position. Check the bolts in the middle of the fork frame frequently, which prevent the forks from being used in the opening position.

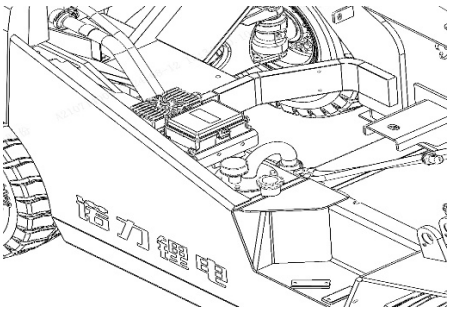
Steps and handrails for boarding and exiting

There are steps for getting on and off the forklift on both sides of the vehicle body, and a handrail for getting on and off the forklift on the left leg of the overhead guard. Always face the forklift when getting on and off the forklift. Please use the handrail for safety when getting on and off the forklift.

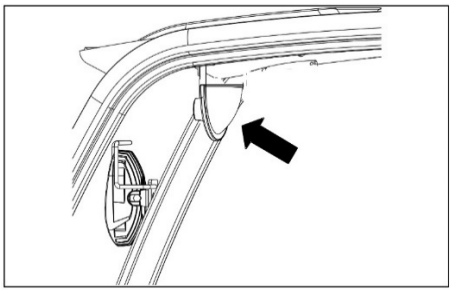


Hydraulic oil tank cap

The hydraulic oil tank cap is located on the left frame inside the hood. Open the hood when refueling. Fill clean hydraulic oil through the refueling port and tighten the cap after refueling.



Reflector

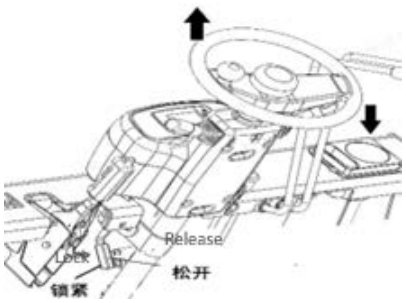


An arc-shaped reflector is installed on the upper right side of the overhead guardrail, which is used to observe the situation at the rear of the vehicle or when reversing.

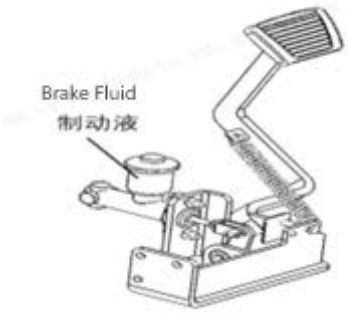
Steering column positioning device

Adjust and secure the steering column to the required distance.

The forklift's steering column is adjustable to suit the operator's needs. Move the handle upwards to release the steering column; move it downwards to lock it.



Brake fluid tank

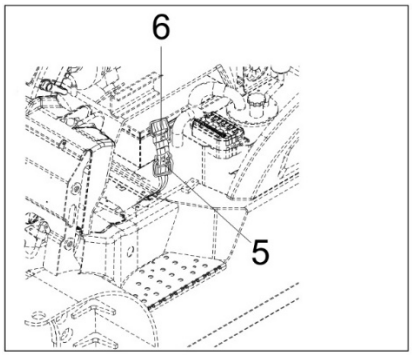


The brake fluid reservoir is mounted in the instrument panel directly below the steering wheel. The translucent reservoir allows the brake fluid level to be checked from the outside.

Attention

When adding brake fluid, prevent dust and debris from entering the oil cup. Brake fluid is corrosive and toxic.

Socket plug



1. 7 Fork adjustment and replacement

Adjusting the fork spacing

In order to ensure the operational safety of the picking process, before the picking operation, the spacing of the forks needs to be adjusted to the appropriate position according to the size of the load pallet.

Steps:

Pull up the fork positioning pin and rotate it 180 degrees in any direction to unlock the fork.

– Adjust the fork position symmetrically at both ends based on the center line of the fork frame.

– After the fork spacing is adjusted, pull up the fork positioning pin and rotate it back to the initial position, then slightly move the fork left and right to ensure that the fork positioning pin is stuck in the slot of the fork frame.

The fork spacing adjustment is complete.

Notice

① The fork positioning pin must be locked (stuck into the slot of the fork frame). If it is not locked, the fork is easy to move during the driving process of the forklift, and the goods may fall.

② When adjusting the fork, there is a risk of pinching, so be careful.

Disassembly of the fork.

Attention

① There is an opening on the lower crossbeam of the fork frame for loading and unloading forks.

② It is forbidden to fix the fork at the opening position of the fork frame to prevent the fork from falling off from the opening position.

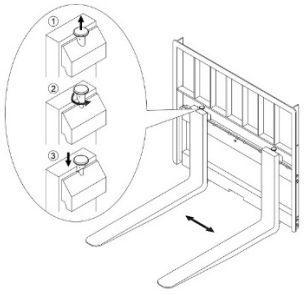
③ There is a bolt in the middle of the upper crossbeam to prevent the fork from working here. If the bolt is damaged, it should be replaced in time.

Disassembly of the fork:

When the fork needs to be replaced, unscrew the fixing bolt in the middle of the fork frame, move the fork to the middle opening of the fork frame crossbeam, then tilt forward and lower the fork until the fork is off the fork frame, and then back up the vehicle.

Installation of the fork:

Place the fork flat on the ground facing the vehicle, lower the fork frame to the lowest position, and slowly move the vehicle forward, align the upper and lower grooves of the fork with the upper and lower beams and gaps of the fork frame, fully lift the fork frame, adjust the left and right positions of the fork and lock it.



1.8 OPS system (optional)

The OPS (Operator Presence Sensing) system is a safety protection system that uses a seat sensor installed in the driver's seat to sense whether the driver is sitting in the seat in the correct posture. If the driver is not sitting in the driver's seat in the correct posture, the driving force will be cut off and all loading and unloading operations will be stopped. It helps prevent accidents when the operator leaves the seat. When the forklift is not in the correct driving position, it is impossible to drive and load and unload the forklift, thereby reducing safety accidents caused by misoperation.

Driving protection function

When the vehicle is in motion, if the driver leaves the seat or the seat belt is loosened (if equipped with a seat belt protection switch) for more than 1 second, the forklift will automatically stop, the seat switch indicator light "  " on the instrument will light up, and the buzzer will emit a continuous alarm sound. Only when the handbrake switch is pulled or the driver sits on the seat correctly and the direction switch returns to neutral, the seat switch indicator light "  " on the instrument will go out and the driving OPS state will be released.

When the vehicle is in working state, if the driver leaves the seat or the seat belt is loosened (if equipped with a seat belt protection switch) for more than 1 second, the work stops automatically, the seat switch indicator light "  " on the instrument lights up, and the buzzer sounds a continuous alarm. The automatic OPS light of the device lights up, the buzzer sounds an alarm, and the handling operation stops automatically. When the driver sits back in the seat correctly, the seat switch indicator light "  " on the instrument goes out, and the working OPS state is released.

Alarm function

Once the seat sensor detects that the seat switch is closed, the buzzer will sound a continuous alarm within about 1 second, and the seat switch indicator light "  " will light up. The seat switch indicator light "  " will light up while the seat switch is closed, indicating that the OPS of the vehicle is in the activated state.

Restore neutral function

If the direction switch is not returned to the neutral position and the seat switch is on, the buzzer will sound a continuous alarm to remind the driver that the driving OPS function is activated.

OPS function exception handling

If the following situations occur, park the vehicle in a safe place and contact a Noli dealer for inspection. a. After the driver leaves the seat, the seat switch indicator light "

 " cannot light up; b. After the driver returns to the seat, the seat switch indicator light "  " cannot go out.

Attention

For forklifts with optional seat belt protection switches, the driver must sit back in the seat correctly and then buckle the seat belt to operate normally. If the OPS system is activated when driving uphill, the driving power will be interrupted and the vehicle will slide. In order to avoid such accidents, be sure to sit in the seat correctly when operating uphill.

Fork lock function after power failure

This function means that when the start switch is turned off or the power is off, the fork is locked and the fork will not drop even if the lowering joystick is operated.

1. 9 Main technical performance parameter table

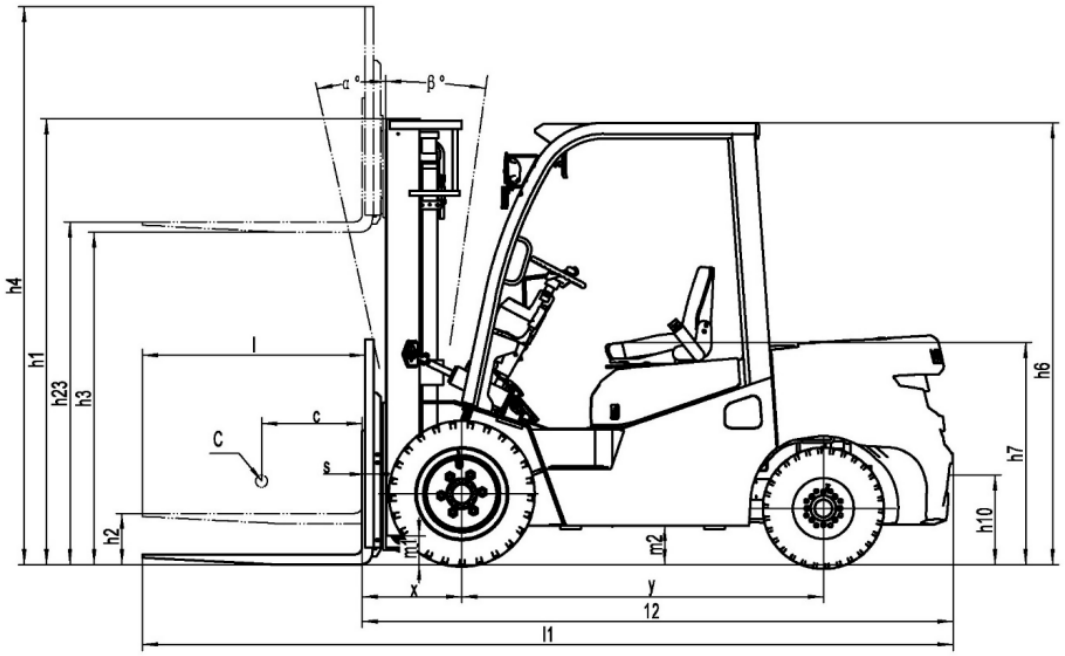
The technical data given below are all standard data. Our company reserves the right to make technical changes and additions.

CPD20/25-AF1H

		project		CPD20-AF1H	CPD25-AF1H
Features	1.1	Manufacturer (abbreviation)		Noblelift A	Noblelift A
	1.2	NobleLift Model		CPD20-AF1H	CPD25-AF1H
	1.3	Power mode: electric (battery or power supply), diesel, gasoline, gas, manual		Lithium battery	Lithium battery
	1.4	Operation mode: manual, walking, standing, riding, picking		Seated	Seated
	1.5	Rated load capacity	kg	2000	2500
	1.6	Load center distance	mm	500	500
	1.8	Front overhang	x(mm)	465	465
	1.9	Wheelbase	y(mm)	1660	1660
weight	2.1	Deadweight	kg	3250	3550
	2.2	Axle load at full load, front/rear	kg	4650/600	5350/700
	2.3	Axle load when unloaded, front/rear	kg	1400/1850	1400/2150
tire	3.1	Tire: solid rubber, superelastic, pneumatic, polyurethane		Pneumatic tire	Pneumatic tire
	3.2	Front wheel specifications		7.00-12-12PR	7.00-12-12PR
	3.3	Rear wheel specifications		6.00-9-10PR	6.00-9-10PR
	3.5	Number of wheels, front wheels/rear wheels (×=driving wheels)		2X/2	2X/2
	3.6	Front wheel track	b10(mm)	973	973
	3.7	Rear wheel track	b11(mm)	980	980
Size param	4.1	Mast/fork frame tilt angle, forward/backward	α/β(°)	6/12	6/12

	4.2	Mast retracted height	h1(mm)	1995	1995
	4.3	Free lifting height	h2(mm)	140	140
	4.4	Lifting height	h3(mm)	3000	3000
	4.4a	Lifting height (including fork thickness)	h23(mm)	3040	3040
	4.5	Mast expansion height	h4(mm)	4025	4025
	4.7	Height of overhead guardrail	h6(mm)	2130	2130
	4.8	Seat height	h7(mm)	1030	1030
	4.12	Height of traction pin	h10(mm)	400	400
	4.19	Total length	l1(mm)	3698	3698
	4.20	Vehicle length (excluding forks)	l2(mm)	2628	2628
	4.21	Overall width (frame/tire)	b1(mm)	1150/1163	1150/1163
	4.22	Fork size	s/e/l(mm)	1070/120/40	1070/120/40
	4.23	Fork installation level		3A	3A
	4.24	Fork carriage width	b3(mm)	1040	1040
	4.31	Ground clearance below mast (no load)	m1(mm)	120	120
	4.32	Wheelbase center ground clearance	m2(mm)	170	170
	4.34.1	Working channel width, 1000X1200 pallet (1200 fork placement)	Ast(mm)	3935	3935
	4.34.2	Working channel width, 800X1200 pallets (1200 placed along the forks)	Ast(mm)	4135	4135
	4.35	Turning Radius	Wa(mm)	2270	2270
	4.36	Inner turning radius	b13(mm)	615	615
Perform	5.1	Travel speed, full/empty	km/h	18/19	18/19

	5.2	Lifting speed, full/empty	mm/s	450/550	450/550
	5.3	Lowering speed, full/empty	mm/s	400/420	400/420
	5.6	Maximum traction, full/unloaded	kN	15/12	15/12
	5.7	Climbing grade, full/no load S2	%	20/20	20/20
	5.10	Service brake		Hydraulic	Hydraulic
	5.11	Parking brake		Mechanical	Mechanical
Battery	6.1	Battery voltage/capacity	V/Ah	80/175	80/175
	6.2	Battery weight	kg	110	110
Motor and controller	7.1	Drive motor power S2-60min	kw	12	12
	7.2	Lifting motor power S3-15min	kw	18	18
	7.3	Drive motor control method		MOSFET/AC	MOSFET/AC
	7.4	Lifting motor control mode		MOSFET/AC	MOSFET/AC
	7.5	Controller Model		FJ-G2-80-02	FJ-G2-80-02
other	10.1	Working pressure of attachments	Mpa	18.5	18.5
	10.2	Attachment Workflow	L/min	50	50
	10.4	Fuel tank capacity	L	60	60
	10.7	Noise level at the driver's ear, according to EN 12053	dB	72	72
	10.8	Kingpin specifications DIN 15170		30	30


α °
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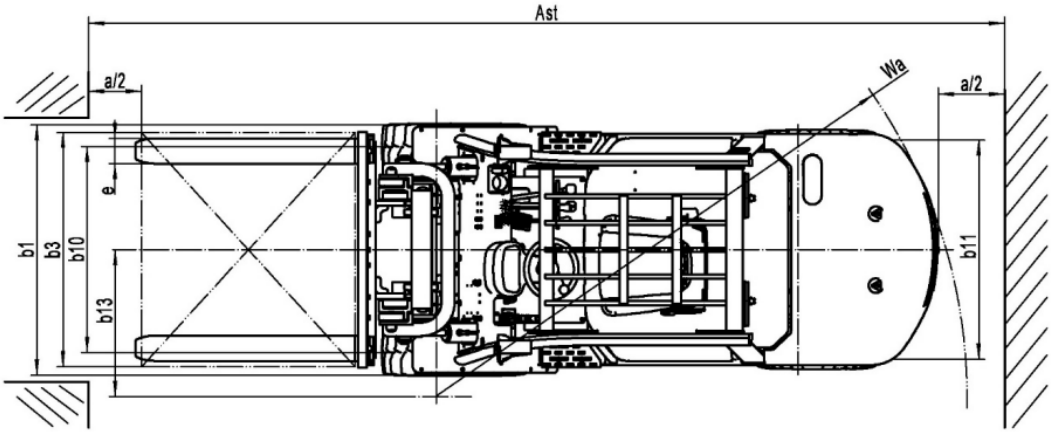
Ast
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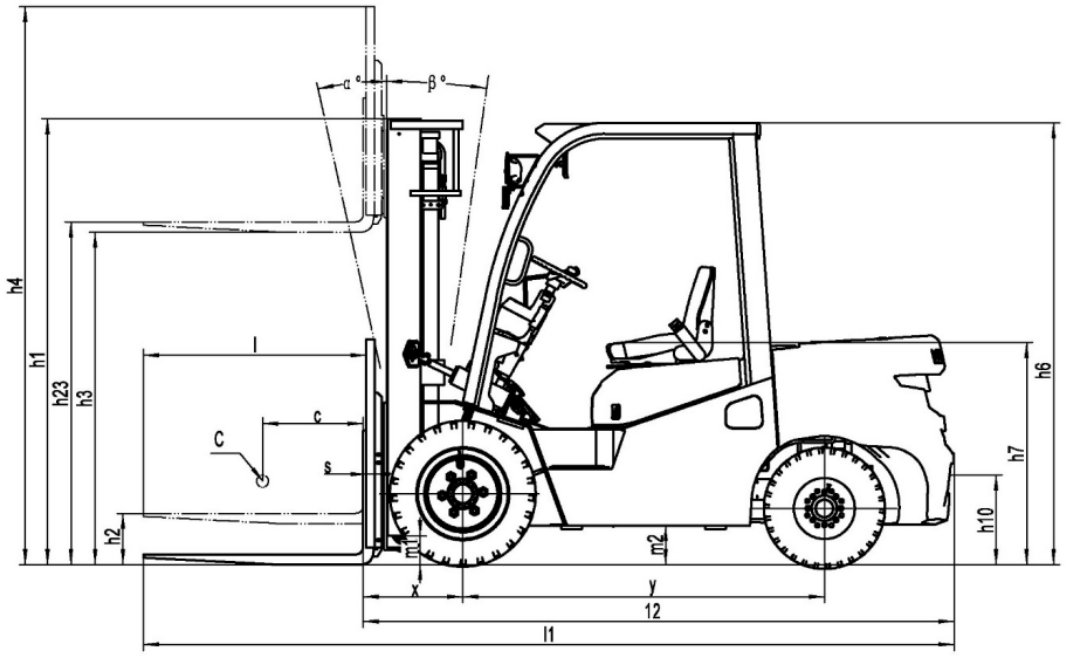
b3
b10
b13
b11

CPD30/35/38- AF1S

		project		CPD30-AF1S	CPD35-AF1S	CPD38-AF1S
Features	1.1	Manufacturer (abbreviation)		Noblelift A	Noblelift A	Noblelift A
	1.2	Noblelift Model		CPD30-AF1S	CPD35-AF1S	CPD38-AF1S
	1.3	Power mode: electric (battery or power supply), diesel, gasoline, gas, manual		Lithium battery	Lithium battery	Lithium battery
	1.4	Operation mode: manual, walking, standing, riding, picking		Seated	Seated	Seated
	1.5	Rated load capacity	kg	3000	3500	3800
	1.6	Load center distance	mm	500	500	500
	1.8	Front overhang	x(mm)	480	485	485
	1.9	Wheelbase	y(mm)	1760	1760	1760
weight	2.1	Deadweight	kg	4100	4400	4600
	2.2	Axle load at full load, front/rear	kg	6390/710	7100/800	7500/900
	2.3	Axle load when unloaded, front/rear	kg	1650/2450	1600/2800	1600/3000
tire	3.1	Tire: solid rubber, superelastic, pneumatic, polyurethane		Pneumatic tire	Pneumatic tire	Pneumatic tire
	3.2	Front wheel specifications		28x9-15-14PR	28x9-15-14PR	28x9-15-14PR
	3.3	Rear wheel specifications		6.50-10-10PR	6.50-10-10PR	6.50-10-10PR
	3.5	Number of wheels, front wheels/rear wheels (×=driving wheels)		2X/2	2X/2	2X/2
	3.6	Front wheel track	b10(mm)	1000	1000	1000
	3.7	Rear wheel track	b11(mm)	980	980	980
Size parameters	4.1	Mast/fork frame tilt angle, forward/backward	α/β(°)	6/12	6/12	6/12
	4.2	Mast retracted height	h1(mm)	2170	2170	2170

	4.3	Free lifting height	h2(mm)	150	150	150
	4.4	Lifting height	h3(mm)	3000	3000	3000
	4.4a	Lifting height (including fork thickness)	h23(mm)	3050	3050	3050
	4.5	Mast expansion height	h4(mm)	4105	4105	4105
	4.7	Height of overhead guardrail	h6(mm)	2150	2150	2150
	4.8	Seat height	h7(mm)	1050	1050	1050
	4.12	Height of traction pin	h10(mm)	420	420	420
	4.19	Total length	l1(mm)	3870	3905	3945
	4.20	Vehicle length (excluding forks)	l2(mm)	2775	2835	2875
	4.21	Overall width (frame/tire)	b1(mm)	1195/1228	1195/1228	1195/1228
	4.22	Fork size	s/e/l(mm)	1070/122/45	1070/122/50	1070/122/50
	4.23	Fork installation level		3A	3A	3A
	4.24	Fork carriage width	b3(mm)	1100	1100	1100
	4.31	Ground clearance below mast (no load)	m1(mm)	140	140	140
	4.32	Wheelbase center ground clearance	m2(mm)	190	190	190
	4.34.1	Working channel width, 1000X1200 pallet (1200 fork placement) Working channel width, 1000X1200 pallet (1200 fork placement)	Ast(mm)	4130	4195	4225
	4.34.2	Working channel width, 800X1200 pallets (1200 placed along the forks)	Ast(mm)	4330	4395	4425
	4.35	Turning Radius	Wa(mm)	2450	2510	2540
	4.36	Inner turning radius	b13(mm)	715	715	715
Performan	5.1	Travel speed, full/empty	km/h	15/15	15/15	14/15
	5.2	Lifting speed, full/empty	mm/s	460/480	300/420	300/420

	5.3	Lowering speed, full/empty	mm/s	380/410	380/410	380/410
	5.6	Maximum traction, full/unloaded	kN	15/15	15/15	15/15
	5.7	Climbing grade, full/no load S2	%	15/15	15/15	15/15
	5.10	Service brake		Hydraulic	Hydraulic	Hydraulic
	5.11	Parking brake		Mechanical	Mechanical	Mechanical
Battery	6.1	Battery voltage/capacity	V/Ah	80/205	80/205	80/205
	6.2	Battery weight	kg	130	130	130
Motor and controller	7.1	Drive motor power S2-60min	kw	12	12	12
	7.2	Lifting motor power S3-15min	kw	18	18	18
	7.3	Drive motor control method		MOSFET/AC	MOSFET/AC	MOSFET/AC
	7.4	Lifting motor control mode		MOSFET/AC	MOSFET/AC	MOSFET/AC
	7.5	Controller Model		FJ-G2-80-03	FJ-G2-80-03	FJ-G2-80-03
other	10.1	Working pressure of attachments	Mpa	18.5	18.5	18.5
	10.2	Attachment Workflow	L/min	50	50	50
	10.4	Fuel tank capacity	L	70	70	70
	10.7	Noise level at the driver's ear, according to EN 12053	dB	73	73	73
	10.8	Kingpin specifications DIN 15170		30	30	30


α °
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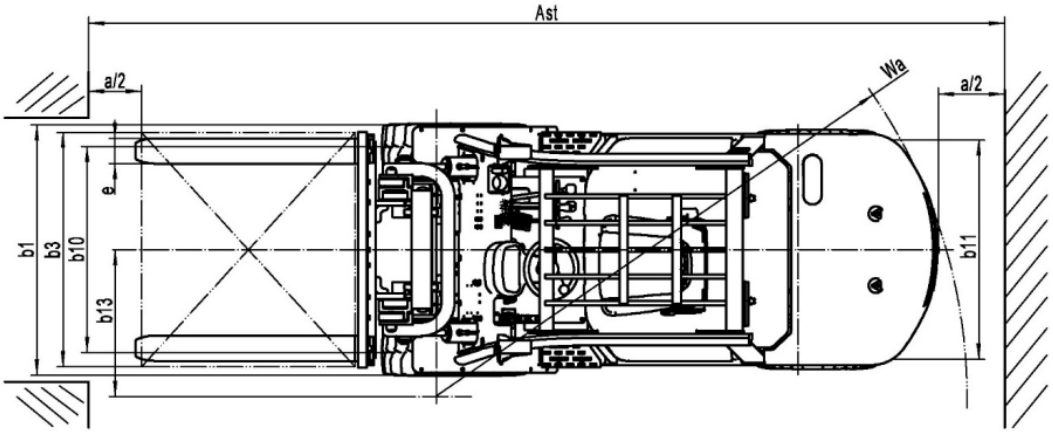
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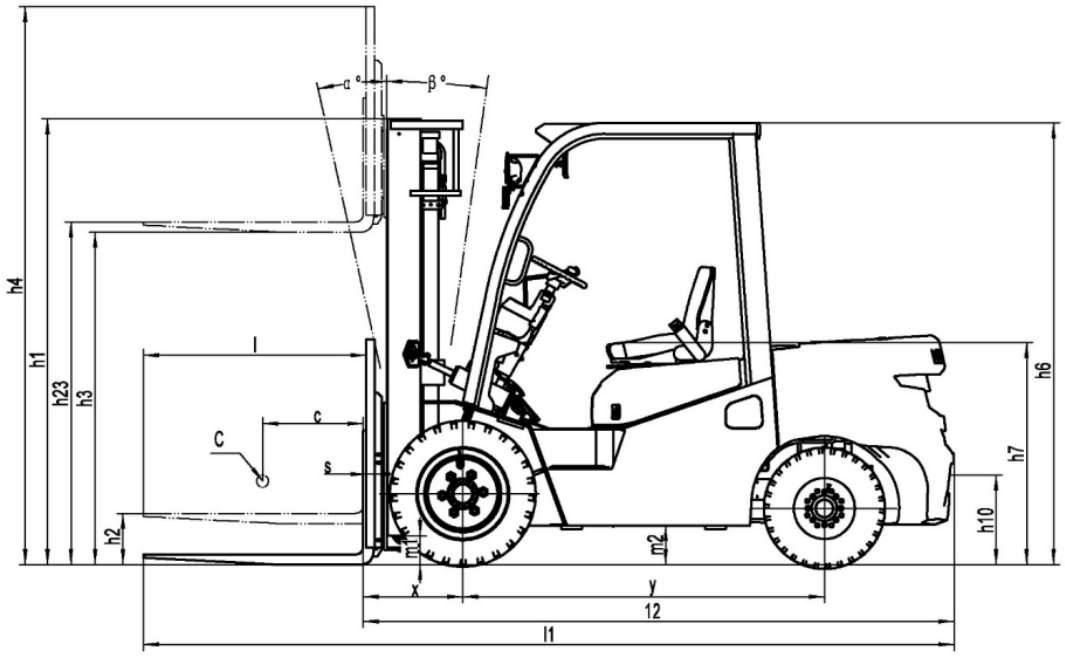
b3
b10
b13
b11

CPD/30/35/38- AF2H

		project		CPD30-AF2H	CPD35-AF2H	CPD38-AF2H
Features	1.1	Manufacturer (abbreviation)		Noblelift N1	Noblelift N1	Noblelift N1
	1.2	Noblelift model		CPD30- AF2H	CPD35- AF2H	CPD38- AF2H
	1.3	Power mode: electric (battery or power supply), diesel, gasoline, gas, manual		Lithium battery	Lithium battery	Lithium battery
	1.4	Operation mode: manual, walking, standing, riding, picking		Seated	Seated	Seated
	1.5	Rated load capacity	kg	3000	3500	3800
	1.6	Load center distance	mm	500	500	500
	1.8	Front overhang	x(mm)	480	485	485
	1.9	Wheelbase	y(mm)	1760	1760	1760
weight	2.1	Deadweight	kg	4180	4480	4680
	2.2	Axle load at full load, front/rear	kg	6430/750	7140/840	7540/940
	2.3	Axle load when unloaded, front/rear	kg	1690/2490	1630/2850	1630/3050
tire	3.1	Tire: solid rubber, superelastic, pneumatic, polyurethane		Pneumatic tire	Pneumatic tire	Pneumatic tire
	3.2	Front wheel specifications		28x9-15-14PR	28x9-15-14PR	28x9-15-14PR
	3.3	Rear wheel specifications		6.50-10-10PR	6.50-10-10PR	6.50-10-10PR
	3.5	Number of wheels, front wheels/rear wheels (×=driving wheels)		2X/2	2X/2	2X/2
	3.6	Front wheel track	b10(mm)	1000	1000	1000
	3.7	Rear wheel track	b11(mm)	980	980	980
Size parameters	4.1	Mast/fork frame tilt angle, forward/backward	α/β(°)	6/12	6/12	6/12
	4.2	Mast retracted height	h1(mm)	2170	2170	2170
	4.3	Free lifting height	h2(mm)	150	150	150
	4.4	Lifting height	h3(mm)	3000	3000	3000

	4.4a	Lifting height (including fork thickness)	h23(mm)	3050	3050	3050
	4.5	Mast expansion height	h4(mm)	4105	4105	4105
	4.7	Height of overhead guardrail	h6(mm)	2150	2150	2150
	4.8	Seat height	h7(mm)	1050	1050	1050
	4.12	Height of traction pin	h10(mm)	420	420	420
	4.19	Total length	l1(mm)	3870	3905	3945
	4.20	Vehicle length (excluding forks)	l2(mm)	2775	2835	2875
	4.21	Overall width (frame/tire)	b1(mm)	1195/1228	1195/1228	1195/1228
	4.22	Fork size	s/e/l(mm)	1070/122/45	1070/122/50	1070/122/50
	4.23	Fork installation level		3A	3A	3A
	4.24	Fork carriage width	b3(mm)	1100	1100	1100
	4.31	Ground clearance below mast (no load)	m1(mm)	140	140	140
	4.32	Wheelbase center ground clearance	m2(mm)	190	190	190
	4.34.1	Working channel width, 1000X1200 pallet (1200 fork placement)	Ast(mm)	4130	4195	4225
	4.34.2	Working channel width, 800X1200 pallets (1200 placed along the forks)	Ast(mm)	4330	4395	4425
	4.35	Turning Radius	Wa(mm)	2450	2510	2540
	4.36	Inner turning radius	b13(mm)	715	715	715
Performance parameters	5.1	Travel speed, full/empty	km/h	19/19	19/19	18/19
	5.2	Lifting speed, full/empty	mm/s	520/560	400/500	400/500
	5.3	Lowering speed, full/empty	mm/s	380/410	380/410	380/410
	5.6	Maximum traction, full/unloaded	kN	21/15	21/15	21/15
	5.7	Climbing grade, full/no load S2	%	20/20	20/20	20/20
	5.10	Service brake		Hydraulic	Hydraulic	Hydraulic
	5.11	Parking brake		Mechanical	Mechanical	Mechanical
Battery	6.1	Battery voltage/capacity	V/Ah	80/300	80/300	80/300
	6.2	Battery weight	kg	210	210	210

Motor and controller	7.1	Drive motor power S2-60min	kw	17	17	17
	7.2	Lifting motor power S3-15min	kw	26	26	26
	7.3	Drive motor control method		MOSFET/AC	MOSFET/AC	MOSFET/AC
	7.4	Lifting motor control mode		MOSFET/AC	MOSFET/AC	MOSFET/AC
	7.5	Controller Model		FJ-G2-80-05	FJ-G2-80-05	FJ-G2-80-05
Other	10.1	Working pressure of attachments	Mpa	18.5	18.5	18.5
	10.2	Attachment Workflow	L/min	50	50	50
	10.4	Fuel tank capacity	L	70	70	70
	10.7	Noise level at the driver's ear, according to EN 12053	dB	73	73	73
	10.8	Kingpin specifications DIN 15170		30	30	30


α °
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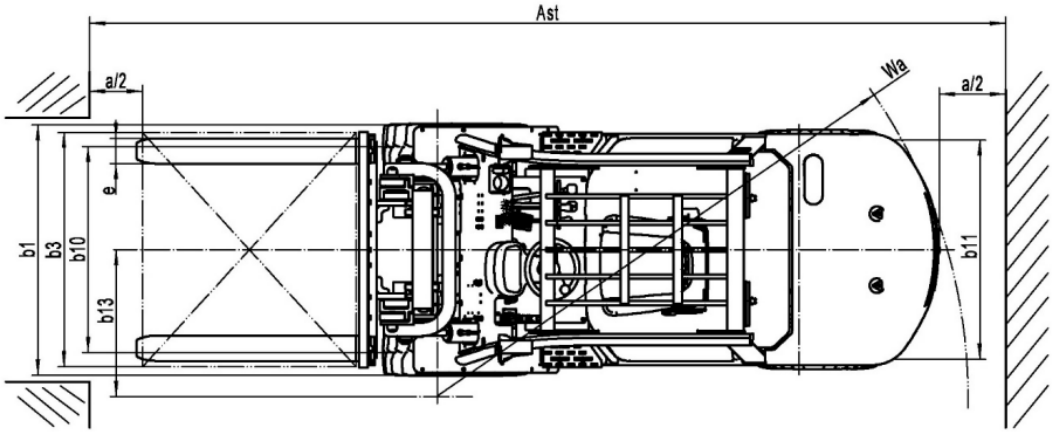
Ast
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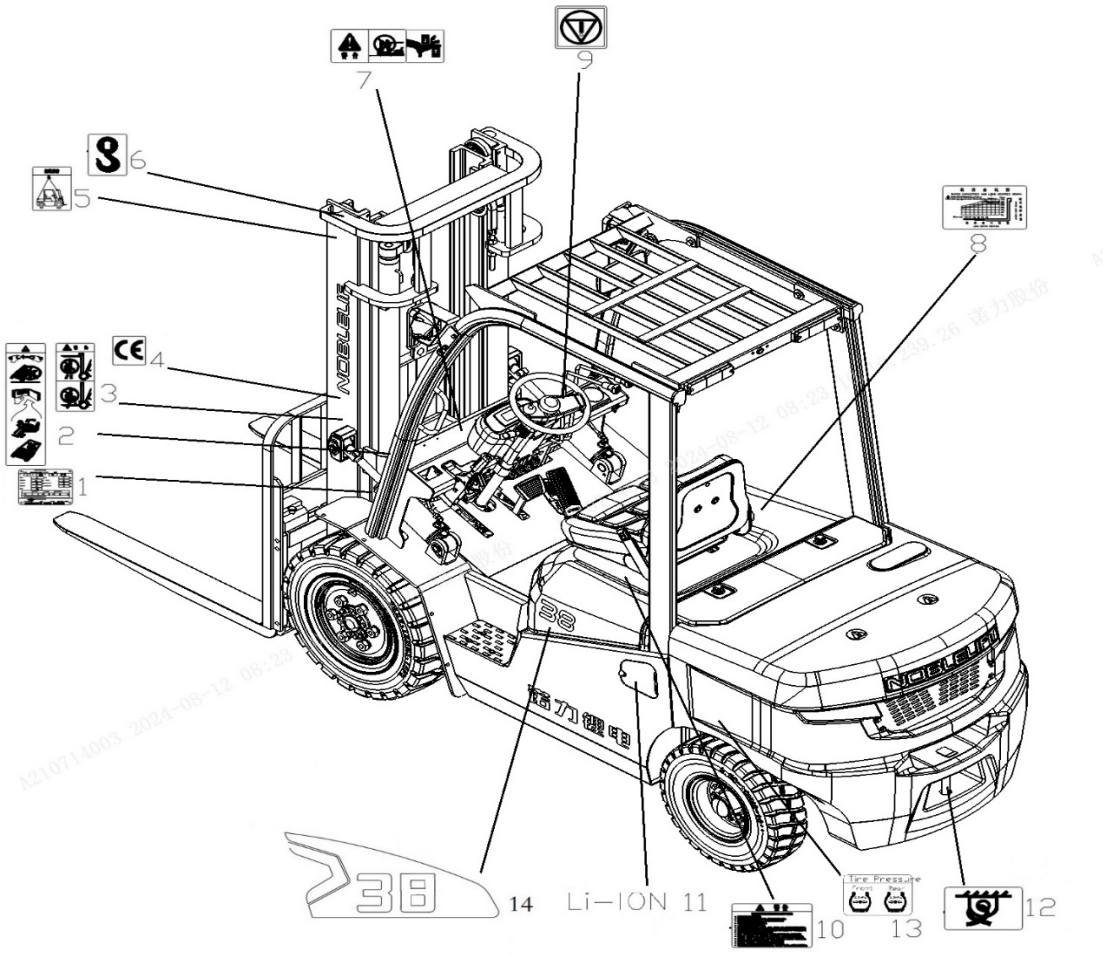
b11

1.10 Product label and warning label location

Labels and warning signs, such as product nameplates, load curve labels, warning labels, etc. must be clearly readable. If they are not legible, they must be replaced.

The following figure shows the approximate location of the various symbols. Please understand the meaning of the various symbols before operating the forklift.



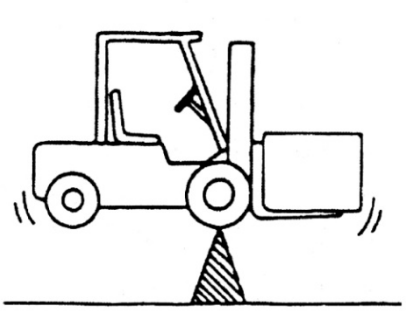
No.	name
1	Product nameplate
2	Warning label: What to do if the forklift rolls over.
3	Danger label: No one is allowed to stand on the fork or under the fork
4	CE label (CE vehicles only)
5	Lifting method label: Lifting method when loading or unloading with a crane.
6	Lifting point label: The fixing point of the equipment when loading and unloading with a crane
7	Danger label: Be careful of being pinched when the mast moves
8	Load Curve Label
9	Emergency Stop Switch Labels
10	Warning label: What to do if the forklift rolls over.
11	Lithium battery power label
12	Tie-down point label: Tie-down point when towing

13	Tire pressure label (optional, for pneumatic tires only)
14	Tonnage label

1.11 Forklift structure and stability

Prevent the forklift from tipping over! Knowing the forklift structure and stability is important for safe operation of the forklift.

Forklift structure



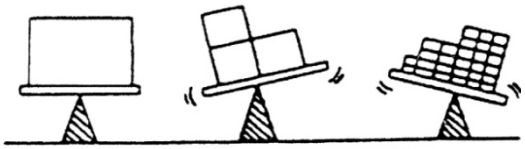
The basic components of a forklift are the lifting device (forks and mast) and the forklift itself (with tires) at the rear.

The front wheels of the forklift act as a fulcrum to balance the center of gravity of the forklift with the center of gravity of the load.

The relationship between the center of gravity of the forklift and the center of gravity of the load is very important to keep the forklift operational.

Load center of gravity

The loads handled by forklifts come in many different shapes, from boxes to wooden boards and long objects. In order to evaluate the forklift and its stability, it is very important to distinguish the center of gravity of the loads of different shapes.

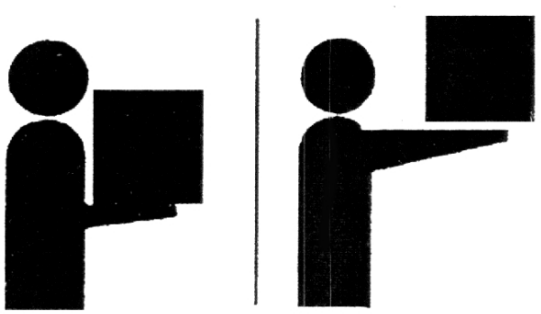


Warning

If the forklift starts to roll over, don't try to jump out. The forklift will roll over much faster than you can jump out. Spread your feet, and then hold yourself in the cab by holding the steering wheel with both hands.

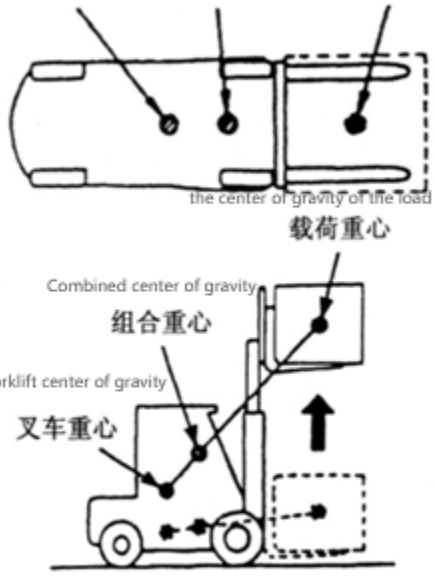
warning	Buckle up In case of a rollover follow this	Tilt the body in the opposite	Hold on to the steering wheel	Support your feet	Don’t jump off

Maximum load and load center distance



The horizontal distance between the center of gravity of the load on the forks and the fork stop or the front surface of the forks (whichever is smaller) is called the load center distance. The maximum load is the maximum load that can be supported at the standard load center distance. The relationship between the maximum load and the load center distance is specified on the forklift's load capacity chart. If the load center distance moves in front of the forks, the overall center of gravity moves forward, so the load must be reduced.

Center of gravity and stability



The stability of a forklift is determined by the combined center of gravity of the forklift's centers of gravity.

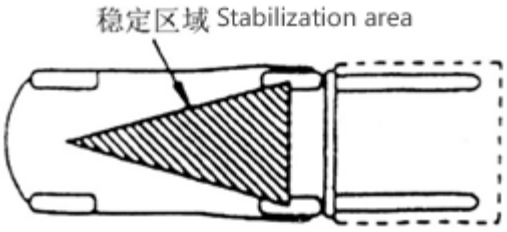
When the forklift is unloaded, the center of gravity remains unchanged; when the forklift is loaded, the center of gravity is the combination of the forklift and the load centers of gravity.

The load center of gravity is determined by the forward or backward tilt of the mast, the mast raised or lowered, and therefore the combined center of gravity changes accordingly.

The combined center of gravity of the forklift is determined by the following factors:

– Load size, weight and shape;
– Lifting height;
– Mast tilt angle;
– Tire inflation pressure;
– Acceleration, deceleration and turning radius;
– Road surface conditions and road surface inclination;
– Type of attachments.

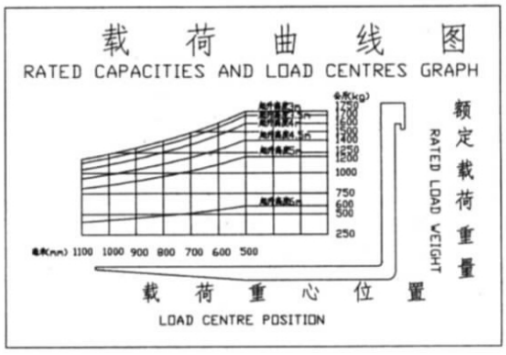
Stable area of the center of gravity



In order for the forklift to be stable, the combined center of gravity must be located within the triangle formed by the landing point of the left and right front tires and the midpoint of the rear axle.

If the combined center of gravity is located on the front axle, the two front tires will form a fulcrum and the forklift will tip forward. If the combined center of gravity moves out of the center of gravity stability triangle, the forklift will tip in the direction in which the combined center of gravity moves out of the triangle.

Carrying capacity chart



This diagram shows the relationship between the position of the load center distance and the maximum load. Before loading, check that the load and load center distance are within the range allowed by the load capacity diagram. If the load has a complex shape, place the heaviest part of the load at the center of the forks and close to the backrest.

Speed and acceleration

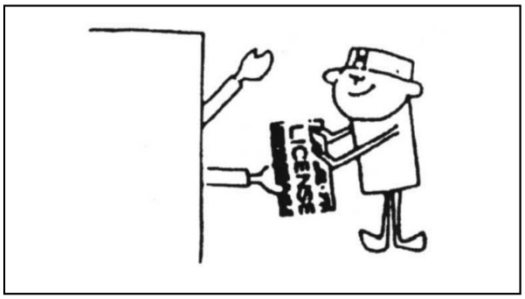
An object at rest will remain at rest if no external force is acting on it. Likewise, an object in motion will continue to move at the same speed if no external force is acting on it. This is inertia. Due to inertia, a force acts backward when the forklift starts moving and a force acts forward when the forklift stops.

Applying the brakes suddenly is dangerous because a large force acts forward, causing the forklift to tip over or the load to slide off. When the forklift turns, a centrifugal force is applied outward from the center of the turn. This force pushes the forklift outward and causes it to tip over.

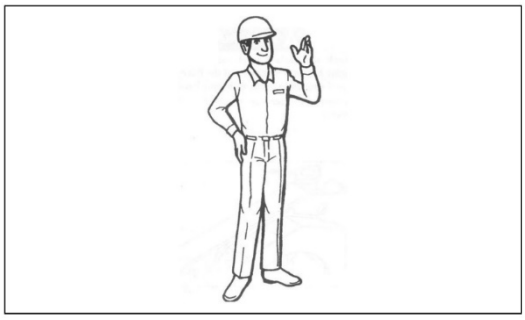
The stable area to the left and right is small, so the forklift must slow down when turning to prevent it from tipping over. If the forklift is carrying a high load, the overall center of gravity is high, so the forklift is more likely to tip forward, left, or right.

2 **Safety Rules**

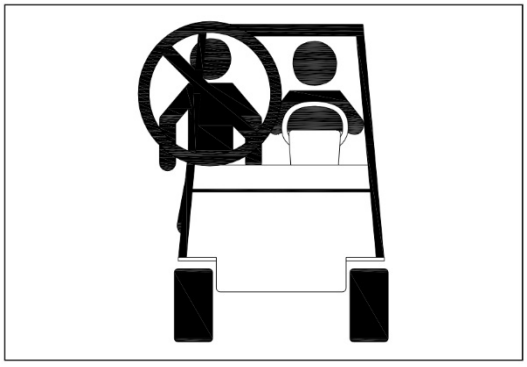
1. Only trained and approved operators are allowed to operate forklifts.



2. Operators must wear helmets, work shoes and work clothes.



3 No pick-up allowed!

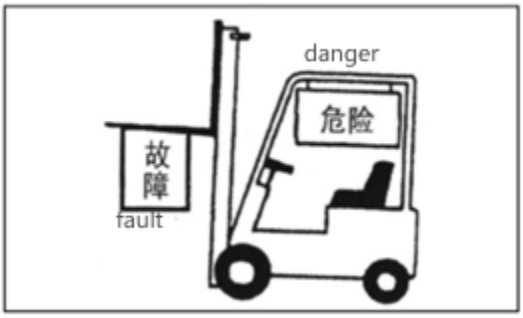


4. Check for oil and fluid leakage, deformation, looseness, etc. regularly. Ignoring the inspection will shorten the life of the vehicle and may cause accidents in severe cases.

- Make sure to replace "safety parts" during regular inspections.
- Wipe off oil, grease or water on the floor, pedals and joysticks.
- Smoking or any sparks or smoke are strictly prohibited when checking the battery.
- If high-position maintenance (such as masts, front and rear lights, etc.) should be paid attention to safety to prevent pinching or slipping.
- Be careful not to get burned when checking motors, controllers, etc.

5. Whenever a malfunction occurs, the forklift must be stopped, a "Danger" or "Fault" sign must be hung on the vehicle, the key must be removed, and the manager must be notified. The forklift can only be used after the fault is eliminated.

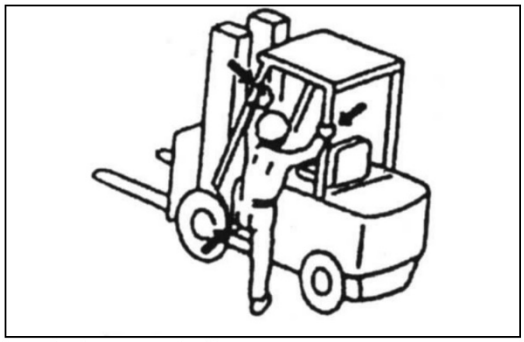
- If a sudden malfunction occurs during lifting of goods, uphill or downhill driving, or battery electrolyte, hydraulic oil, or brake fluid leaks, personnel must be organized to repair it immediately.



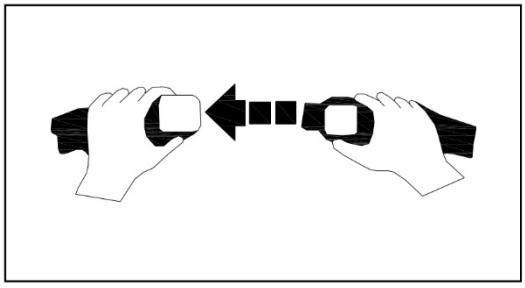
6. Explosive gas will be generated inside the battery. Do not allow any flame to approach the battery. Do not allow tools to approach the battery terminals to avoid sparks or short circuits.

7. The forklift operation surface is a solid, flat concrete road or a similar road surface suitable for vehicle operation. Check the

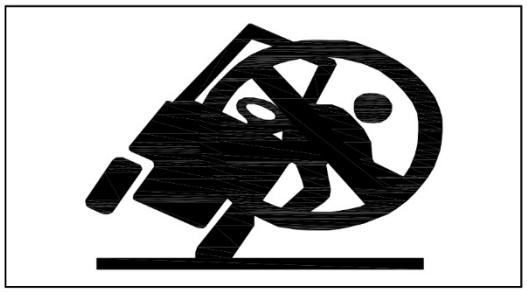
ground conditions of the work site in advance.
– The climatic conditions considered when designing the forklift are: temperature -20℃-50℃; wind speed not exceeding 5m/s; relative humidity not exceeding 90% (temperature 20℃).
– The forklift is not suitable for working in flammable and explosive environments.
– The altitude shall not exceed 2000 meters.
8. Do not get on or off the forklift while it is in operation. Please use the forklift's safety pedals and safety handrails when getting on or off the forklift.



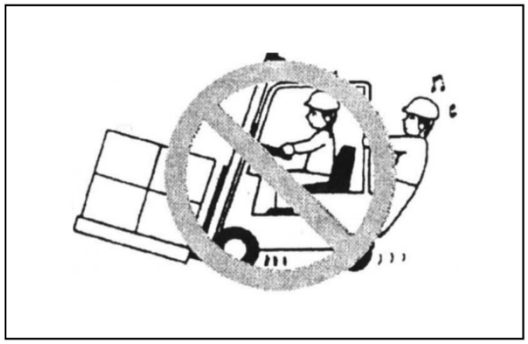
9. Sit firmly before operation.
– Before starting, adjust the seat position to facilitate hand and foot operation.
10. Confirmation before starting
– Please fasten your seat belt.



– Release the handbrake.
– The reversing lever is in neutral.
– No one is on the forklift, up, down, in front, or behind.
– Do not press the accelerator pedal or operate the lifting lever or tilting lever before turning on the power.
– The operation should be smooth and accurate. Sudden braking and sharp turns are prohibited. Emergency braking may cause the vehicle to overturn. It is prohibited to jump out of the vehicle when the vehicle overturns.



11. Pay attention to the direction of travel and maintain a good view.
– Pay special attention to the direction of travel when reversing.
12. Choose appropriate attachments and tools according to the shape and material of the cargo to be loaded.
– Do not use ropes to hang on the forks or attachments to lift the cargo, as the ropes may slip. If necessary, have a qualified person to carry out the lifting operation use a hook or a crane arm.
– Be careful not to let the forks touch the road surface to avoid damaging the fork tips and the road surface.
13. Understand the load curves of the forklift and attachments. Overloading is prohibited, and people are prohibited from being used as additional counterweights.



14. Focus on your work.

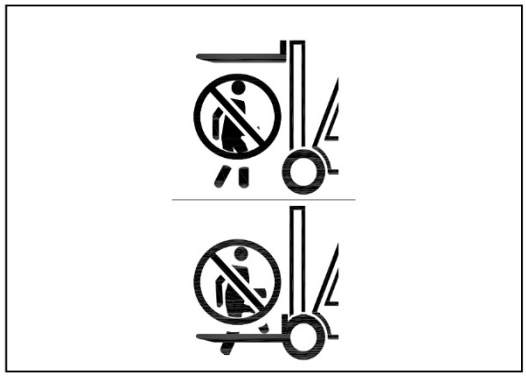
15. Keep your head, hands, arms, legs and feet inside the cab and do not extend them for any reason.

16. The pallet or the pad must be strong enough to bear the weight of the goods. It is forbidden to use damaged or deformed pallets.

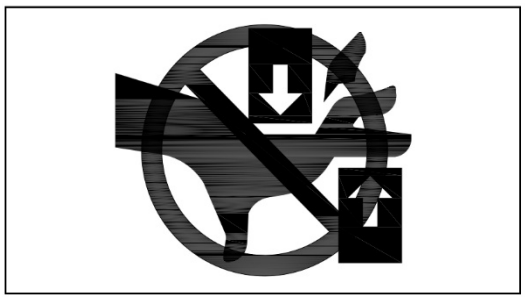
17. Noli provides users with a variety of accessories, such as rotating clamps, flat clamps, side shift forks, lifting arms, etc., which can only be used for special purposes. If you need to modify the accessories, you must obtain permission from the manufacturer. It is strictly forbidden to modify the accessories yourself.

18. The overhead guard prevents being hit by high-altitude goods. The backrest ensures stable loading. Forklifts without overhead guards and backrests are not allowed.

19. It is forbidden to stand or walk under the raised forks or accessories, and it is forbidden to stand on the forks. If it is unavoidable, choose a safe place and use wooden blocks to support the forks or accessories to prevent accidents.



20. It is strictly forbidden to put your head or body between the door frame and the roof guard. Once caught, your life will be in danger.



21. When the cargo deviates from the center of the fork, turns or passes through uneven roads, it is easy to fall. At the same time, the possibility of overturning increases.

22. The cargo should not be stacked higher than the shelf. If it is unavoidable, the cargo should be fixed firmly. When carrying large-volume cargo that obstructs vision, you should drive in reverse or be guided by a guide. When guided by a guide, you must understand the meaning of his hand, flag, whistle or other signals. When carrying long cargo such as wood, pipes, etc. and oversized cargo or operating a vehicle with extended attachments, you must pay full attention to the front and be careful of other people when turning or driving in narrow passages.

23. When stacking and unloading, try to reduce the forward tilt angle as much as possible. You can only tilt forward when the cargo is slightly higher than the stacking layer or at a low position.

– When stacking at high places, make the mast vertical when it is 15cm to 20cm off the ground, and then lift it. Be careful not to let the mast tilt when the cargo is raised.

– When picking up goods from a height, insert the fork into the pallet, slowly lift it up, move it back, and then lower it. After lowering, the mast will tilt backwards. Never tilt the mast when the goods are at a height.

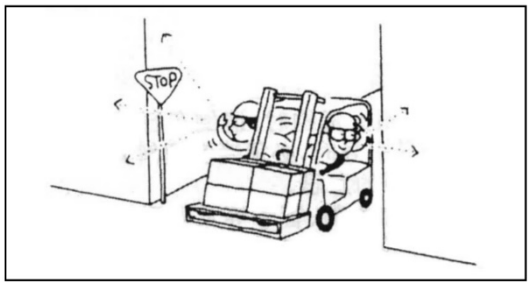
24. Whether the fork is empty or loaded, it is dangerous to drive with the fork raised. Keep the fork 15cm to 30cm off the ground and drive with the mast tilted backwards. Do not move the fork of a forklift with a side shifter sideways when the load is raised to prevent the forklift from losing balance.

25. It is prohibited to tilt the mast forward when the cargo is raised.

26. When working in crowded places, pay attention to the forks, ropes, entrances and exits, and hanging objects.

– Slow down and honk when passing through cross passages or other sections with poor visibility.

– When turning, the speed should be limited to 1/3 of the vehicle's maximum operating speed.



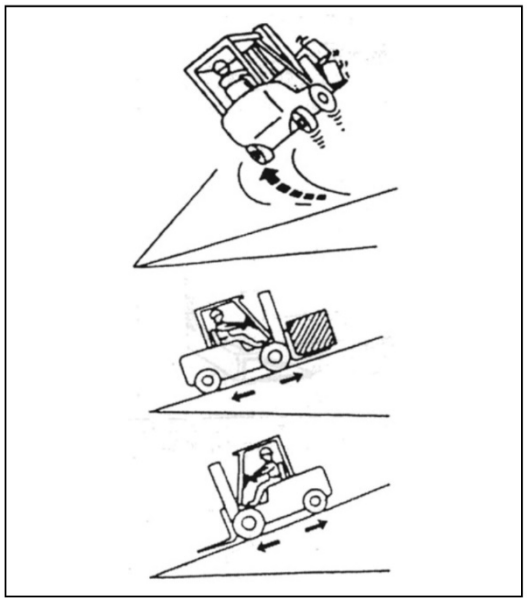
27. Make sure to keep a distance from the roadside or platform edge.

28. When passing through a ship deck or bridge deck, make sure it is properly fixed and strong enough to bear the weight of the forklift.

29. When loaded, reverse downhill and forward uphill.

– When unloaded, reverse uphill and forward downhill.

– Do not turn on the ramp to avoid tipping.

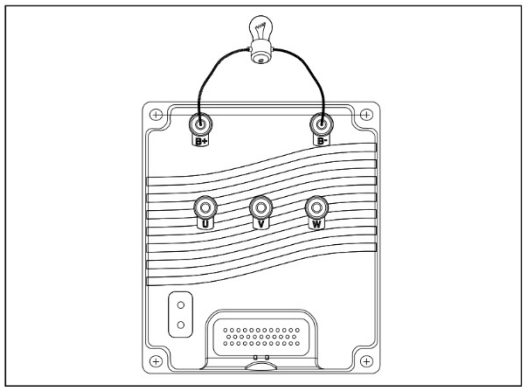


31. Do not lift cargo when the forklift is on a sloping ground, and avoid loading and unloading on a slope.

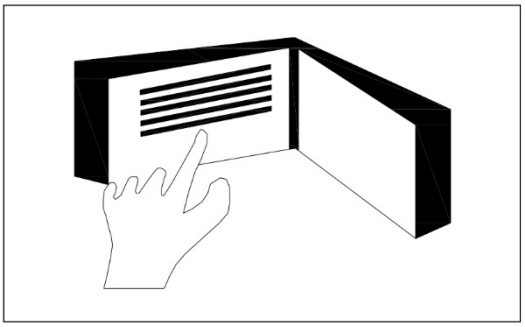
32. Check the road you are going to drive on, check for holes, steep slopes, obstacles, protrusions, and road conditions that may cause loss of control, bumps, etc.

– Remove garbage, debris, and foreign objects that may puncture tires and cause cargo to lose balance.

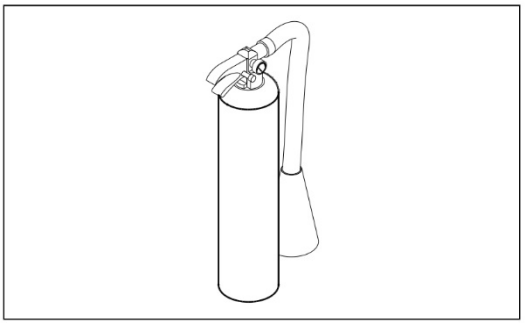
– Drive slowly on slippery roads, do not drive on the edge of the road, and be extra careful when it is unavoidable.
– Do not use a forklift in severe weather conditions such as wind and sand, snow, lightning, heavy rain, typhoons, etc. Especially when the wind speed is greater than 5m/s, avoid using a forklift.
33. The controller has an accumulator, and B+ and B- cannot be touched by hand to prevent electric shock. To check or clean the controller, please disconnect the power supply of the entire vehicle first, and then connect a load (such as a light bulb, resistor, horn, etc.) between B+ and B- of the controller to discharge the capacitor in the controller.



34. Park the vehicle on flat ground and apply the handbrake. If you must park on a slope, be sure to use wedges to pad the wheels.
– Lower the forks to the ground and tilt them slightly forward, turn off the key switch, and remove the key.
– Unplug the battery.
– Park the vehicle away from fireworks.
35. When the forklift cannot drive, you can use the towing pin to tow the forklift to a safe place. Do not tow a forklift with a damaged steering system or brake system.
36. The signs and labels on the vehicle have warnings and operating instructions. Please follow the requirements of this manual and the signs and labels on the vehicle during operation. Check the signs, labels, and logos, and replace damaged or lost signs, labels, and logos.



37. Fire extinguishers should be installed at the workplace. Users can also choose to equip the vehicle with fire extinguishers, which are generally installed on the rear legs of the safety rack for easy access. Drivers and managers need to be familiar with the location and use of fire extinguishers.



38. When transporting small items, a pallet should be used and it is not allowed to be placed directly on the forks.
39. Cold storage vehicles are not allowed to be parked in the cold storage with the engine turned off.

3 **Electric forklift battery operation and safety precautions**

No.	Operation and precautions
1	It is not allowed to open the battery box cover for maintenance. When there is a battery failure, contact the manufacturer in time.
2	Reverse charging of the battery is strictly prohibited.
3	Whether charging or discharging, it should be ensured that the battery management system is correctly connected and working normally to ensure that the battery management system communicates normally.
4	It is forbidden to use it in places with strong static electricity and strong magnetic fields, otherwise it will easily damage the battery safety protection device and bring potential safety hazards.
5	The battery system or battery box should be kept away from heat sources and fire sources, and should be protected from long-term direct sunlight. The battery should not be directly heated by baking or hot water, otherwise it may cause an explosion. Operation in a high-temperature environment is not allowed.
6	Do not place the battery pack in water or in a high humidity environment to avoid leakage or insulation failure.
7	When working in a low temperature environment, the battery system capacity may decrease slightly, which is normal. The performance will recover after the ambient temperature rises.
8	It is forbidden to modify or dissect the battery system and battery box without authorization to avoid danger. Non-professionals are not allowed to disassemble without authorization to prevent foreign matter from entering the battery pack and causing combustion and explosion.
9	The battery has a special charger and must not be charged with other types of chargers to avoid damaging the battery.
10	It is prohibited to use this series of products in series or parallel with other models or types of batteries.
11	Prevent water ingress and rust on diagnostic ports, connectors, and plug-in connectors.
12	Do not mix battery boxes with batteries of other types or from other manufacturers.
13	It is prohibited to directly connect the positive and negative poles of the battery box or battery system with metal or other conductors to avoid sparks or short circuits; it is also prohibited to contact or mix the battery pack with objects that can cause short circuits.
14	Avoid mechanical damage to the battery box, such as squeezing, puncture, vibration, impact, etc.
15	If there is dust, metal filings or other debris on the battery cover and poles, clean them promptly with compressed air or a dry cloth. Do not use water or water-soaked objects for cleaning.

16	The working environment is equipped with water-based fire extinguishers.
17	If the battery system has a sharp rise in temperature or an abnormal smell, the vehicle should be stopped and the power should be turned off immediately. If there is smoke or fire, the vehicle should be stopped and the power should be turned off. While ensuring the safety of personnel, use a water-based fire extinguisher to put out the fire.
18	Charge in a well-ventilated, dry environment.
19	Charging operating temperature: 0℃-45℃; Discharging operating temperature: -20℃-55℃; Short-term storage temperature range: -20℃-40℃ Long-term storage temperature range: 0-25℃ Working humidity range: 5%-80% Storage humidity: ≤70%

Daily charging of battery forklift

No.	Operation and precautions
1	When the forklift instrument shows 1~2 bars of power (i.e. 20%~30% remaining), charge it in time.
2	Turn off the forklift power and press the emergency stop switch.
3	Close the main power input valve of the charger, make sure the emergency stop switch pops up, the charging device automatically turns on, the power indicator light turns on, and the display interface automatically starts.
4	When removing the charging gun, check the charging gun to ensure that there is no water or foreign matter in each port, and that the metal terminals are not damaged or affected by rust or corrosion.
5	Open the battery charging cover. Check the battery charging socket to ensure that there is no water or foreign matter in each port, and that the metal terminals are not damaged or affected by rust or corrosion.
6	Insert the charging plug into the battery charging socket, the charger will self-check and communicate with the battery. When the whole system is fault-free, after about 15S or a certain period of time, the internal relay of the charger will be energized and charging will begin. The charging indicator light will light up, and the instrument will display the charging voltage, charging current value, charging time, charging faults and other information.
7	When the battery is fully charged, the charger will automatically stop charging. At this time, the output voltage and output current on the meter are 0A. Press the pause button and then unplug the charging plug. If the battery needs to be stopped before it is fully charged, press the pause button on the screen first, wait for the charging current to drop to 0A, and then unplug the charging gun or plug.
8	Insert the charging plug into the charger's mounting position and turn off the charger's input power main valve.
9	Close the battery charging cover and the charging door on the forklift body. Plug it into the vehicle's power socket and close the cover. Note: Do not plug the battery discharge plug into the charging socket, otherwise the forklift circuit will have no power.

Daily maintenance of batteries

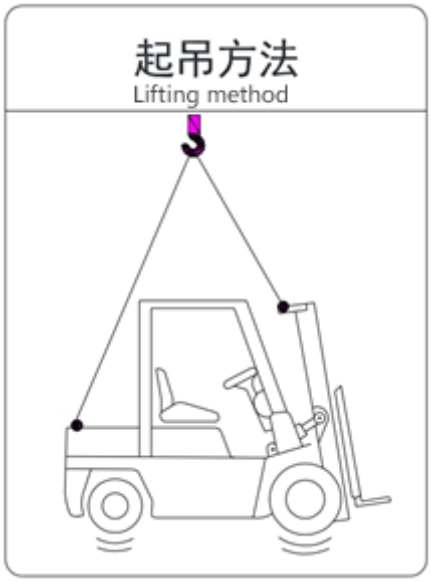
every day	1. Check whether the appearance is deformed, whether the surface is oxidized, whether the paint is peeling, whether the installation position is offset, whether the box is damaged, etc.
Weekly	1. Use dry cloth or compressed air to clean the battery and charger.
per month	1. Check whether there is water or foreign matter in the plug and socket, and check whether it is rusted or burnt.
	2. Check whether the cable is damaged or the connector is loose.
	3. Check whether the battery casing has any abnormal conditions such as cracks, deformation, bulging, etc.

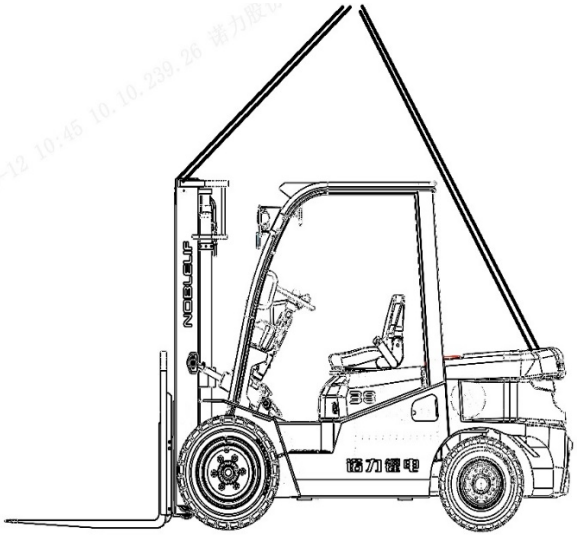
Battery Storage	1. The battery should be stored in a clean, dry, and ventilated indoor environment with an ambient temperature of 20℃±5℃ and a relative humidity of no more than 75%. It should not be inverted to avoid mechanical shock and heavy pressure.
	2. Charge the battery once a month.
	3. The positive and negative terminals of the battery box should be wrapped with high-voltage insulation sleeves or other insulating materials to ensure that no metal parts are exposed to the outside to avoid short circuits. The diagnostic port should be free of dust and wrapped or covered.

4 **Forklift lifting and pulling**

4.1 Lifting

Fasten the wire rope to the lifting holes at both ends of the outer gantry crossbeam and the lifting holes of the counterweight, and then lift the forklift with the lifting device. The wire rope connected to one end of the counterweight must pass through the gap of the overhead guard without causing stress on the overhead guard.





Fasten the wire rope to the lifting holes at both ends of the outer gantry crossbeam and the lifting holes of the counterweight, and then lift the forklift with the lifting device. The wire rope connected to one end of the counterweight must pass through the gap of the overhead guard without causing stress on the overhead guard.

Warning

① Only use lifting tools with sufficient load capacity.

② The mast must be tilted back completely during lifting.

③ When installing the lifting tool, be sure that the lifting tool does not touch the forklift parts or the overhead guard during the lifting process.

④ Never use the cab frame (overhead guard) to lift the forklift.

⑤ When lifting the forklift, do not enter under the forklift.

4.2 towing

It is prohibited to use forklifts for daily towing or towed operations.

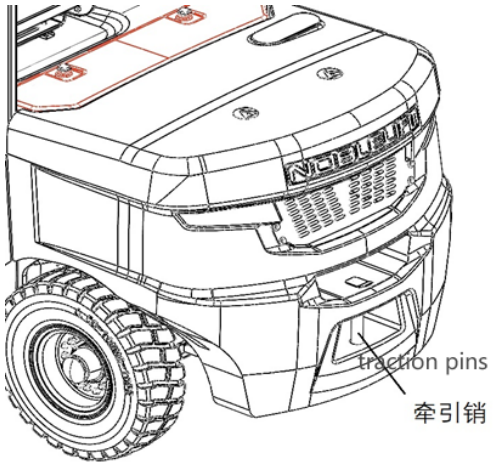
The traction pin (13) at the bottom of the counterweight is only used in the following situations:

– Emergency movement of the forklift when the forklift is suddenly damaged on the working road;

– Emergency movement of the forklift when the forklift is suddenly damaged on the working road;

– Emergency movement of the forklift when it is suddenly damaged on the working road;

– Used to get out of trouble when the forklift is stuck and cannot move (such as wheels stuck in a pothole, etc.).



Operation steps:

– Turn off the key switch and unplug the battery power plug.

– Release the parking brake.

– Put the reversing handle in neutral.

– Tie the towing wire rope.

The forklift can be towed.

Warning

① Do not tow a forklift with an abnormal steering system or a damaged brake system.

② Do not suddenly apply a load to the wire rope.

③ Towing a forklift while it is powered on will damage the controller.

Attention

① Do not tow a forklift with an abnormal steering system or a damaged brake system.

② Do not suddenly apply a load to the wire rope.

③ Towing a forklift while it is powered on will damage the controller.

5 **Battery**

5.1 Safety Tips

1.1 It is strictly forbidden to touch the positive and negative poles of the battery box with both hands at the same time at any time to prevent electric shock.

1.2 Maintenance personnel are required to hold a qualified electrician certificate and ENEROC maintenance authorization issued by the Safety Supervision Bureau before they can carry out maintenance work.

1.3 When operating and maintaining the battery system, you must wear insulating gloves and are strictly prohibited from wearing metal accessories such as watches.

1.4 When cleaning the vehicle, do not flush the battery system directly to prevent water from entering the battery system and causing malfunctions.

5.2 Installation Instructions

5.2.1 Installation instructions: Installers must be certified, wear labor protection equipment, and pay attention to safety protection. Before installing the battery system, ensure that the low-voltage plug-in of the battery system is disconnected from the vehicle components. Pay attention to safety protection when connecting the power high voltage to prevent the installer from electric shock during the installation process. When installing the battery system, mechanical lifting should be adopted, and it should be installed slowly into the battery compartment of the vehicle. Be careful not to squeeze or damage the electrical box and external cables. When connecting the battery system, avoid reverse connection of the high-voltage positive and negative poles, short circuit, etc. If the battery system needs to be removed from the vehicle, ensure that the vehicle key is turned off, and the high-voltage cables, low-voltage plug-ins and the vehicle are disconnected.

2.2 After installation, check the battery system limit pins and fixing bolts to confirm that they meet the battery system installation requirements. Check that the high-voltage cables and low-voltage connectors are connected correctly/reliably. Turn the vehicle key switch to the ON position, and the relay should be able to be normally attracted without battery alarm. If a battery failure alarm occurs, cut off the power supply immediately and notify our after-sales service department for resolution.

5.3 Basic terms for lithium-ion power batteries

3.1 Battery system

Usually includes one or more battery modules, battery management system, thermal management system, high and low voltage wiring harnesses, connectors and structural parts to form an energy storage device.

3.2 SOC

Indicates the remaining battery power percentage.

3.3 Rated voltage

A suitable approximate value used to represent the battery voltage.

3.4 Rated capacity

Under specified conditions, the capacity value indicated by the manufacturer that the battery can provide when fully charged.

3.5 Over discharge

The state when the battery voltage is lower than the discharge cut-off voltage, usually refers to the state entered after the battery is fully discharged.

3.6 Overcharge

The state where the battery voltage is higher than the maximum charge voltage is usually considered to be an overcharged state.

1.7 Explosion: The battery casing ruptures and solid matter inside rushes out of the battery, making a sound.

3.8 Fire: Fire breaks out inside the battery housing.

3.9 Leakage: The internal components of a battery (electrolyte or other substances) leak out of the battery.

3.10 CAN communication: Control Area Network, controller area network.

5.4 Instructions for use

4. 1 Battery temperature characteristics, working environment temperature: -28℃~55℃, allowable charging temperature: 0℃~55℃, allowable discharging temperature: -28℃ ~55℃, storage environment temperature: -28℃~55℃.

4.2 Check before use. After the vehicle key switch is closed, confirm that there is no battery system alarm information on the dashboard. Please check the remaining power before use. It is recommended to use it between SOC 50% and 100%. It is not recommended to continue using it if the SOC is lower than 30%. Please charge it as soon as possible.

4.3 Charging instructions: If the battery system SOC is less than 20%, please charge it in time. Please use the dedicated charging equipment authorized by the manufacturer for charging. If a fault alarm occurs during charging, the battery system and the charger will stop charging, and the charger will display a fault message. The charging environment should be dry and ventilated, with no flammable or explosive items around. The battery system should be fully charged once a week.

4. 4 Before long-term storage, make sure that the battery system power is not less than 50%. Charging maintenance should be performed every three months: charge to 100%. If the storage exceeds three months, please confirm whether there is any fault alarm in the power battery system before using it again. If so, please contact our after-sales service department for maintenance. Keep the storage environment as dry and ventilated as possible, away from heat sources.

Attention: When the ambient temperature is low, the battery system charging time will be longer, which is

normal. To ensure the best performance of the battery system, the battery management system will automatically adjust the charging time as the temperature changes.

5.5 Daily care

5.1 Appearance maintenance: Check the battery system box for foreign matter, obvious deformation, rust and other abnormal conditions.

5.2 Charging port maintenance: When the power is off, check whether there is any abnormality such as damage, foreign matter, rust, etc. in the interface.

5.3 Connector maintenance: When the power is off, check whether the connector is loose, damaged, or other abnormalities.

5.4 Status detection: When charging, observe the battery system voltage, temperature, and other status information on the charger display to ensure that all status information is within the normal range.

5.6 Emergency Plan

6.1 Extreme abnormal conditions: During use, users should establish a good safety awareness, strictly prohibit illegal operations, and avoid battery system abuse (overcharging, over discharging, short circuit, extrusion, puncture, overheating, high current discharge, etc.). During charging and use, abnormal conditions may occur in the power battery system: the battery system or local temperature rises sharply; there is an abnormal smell or smoke in any part of the battery system.

6.2 Emergency plan:

6.2.1 The personnel quickly leave the vehicle and call the police according to the situation on the scene.

6.2.2 Under the condition of ensuring personal safety, perform the following operations under certain conditions:

a. If the external wiring harness smokes and burns, use carbon dioxide or dry powder fire extinguisher to spray.

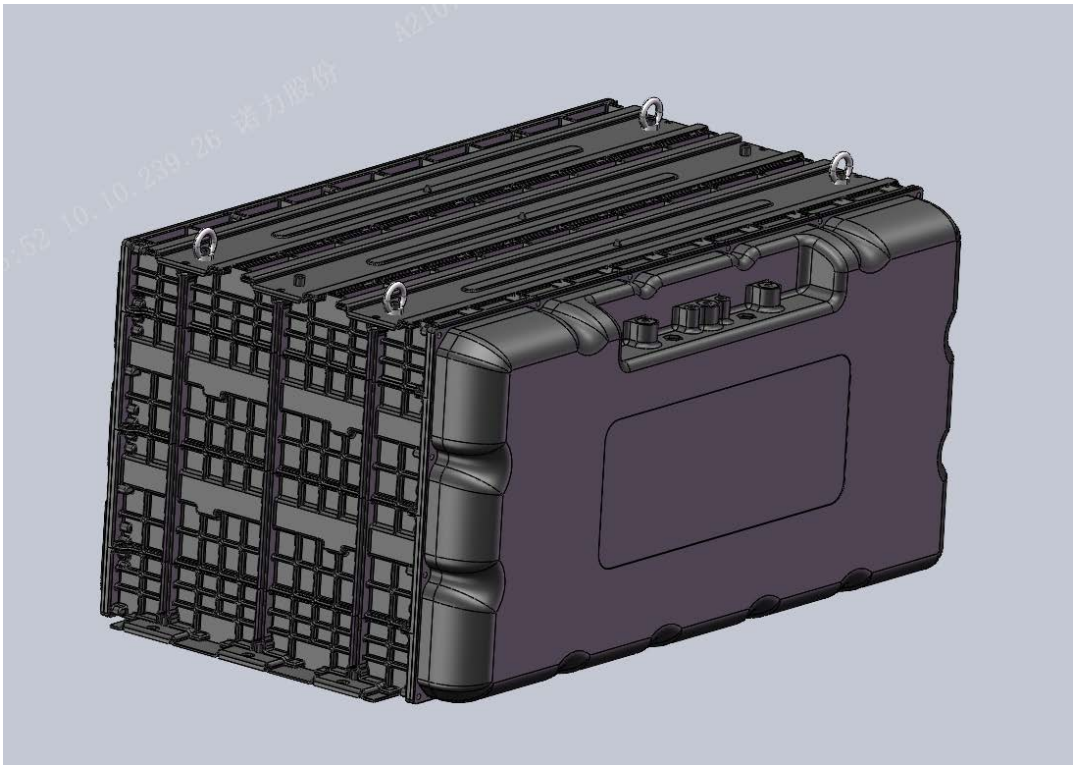
b. If the battery smokes inside, use a high-pressure water gun to spray at a long distance.

c. If you accidentally inhale thick smoke, please move as soon as possible and seek medical treatment.

6.2.3 Contact the vehicle brand dealer to obtain professional treatment advice。

5.7 Dimensions/weight

project	CPD20/25-AF1H	CPD30/35/38-AF1S	CPD30/35/38-AF2H
Length（L） mm	592	660	852
width（W） mm	506	495	510
height（H） mm	248	280	405
Lightest allowed kg	110	130	210
Maximum weight allowed kg	/	/	/



Warning

The weight and size of the battery have a great impact on the stability and load-bearing capacity of the vehicle. When installing or replacing the battery, pay attention to the fixed position of the battery on the vehicle.

5.8 Battery Charging

Lithium battery forklift can be equipped with Huarui Energy charger - Huarui wall-mounted charger

5.8.1 Huarui wall mounted charger

1. Safety Operation Precautions

Please read this manual carefully before installation and use, and check the product packaging and accessories carefully to see if they are complete according to the packing list. To ensure the safety of operators and the normal operation of the charger, please strictly follow the installation procedures, operating procedures and safety tips specified in this operating guide to ensure the normal operation of the equipment. Note: If the product is damaged due to failure to follow the prescribed procedures, the company will not be responsible for product repairs and the additional losses caused by it. Please keep this operating guide properly so that operators can use and refer to it at any time during installation, use and maintenance.

Precautions

① This charger is designed for battery charging only. Do not use it for other purposes.

② The battery needs to match the voltage and current of the charger before the charger can be operated. Electrical safety

③ Please use the input and output sockets that come with this charger. To ensure safe use, do not replace accessories without permission.

④ If the cable, connector or other accessories are found to be damaged, stop using the charger immediately and contact the after-sales service center for repair or replacement. Operating environment safety

⑤ Prevent smoke, water, flames, corrosive gases, etc. from entering the charger.

⑥ If a small amount of liquid invades, please turn off the charger immediately and hand it over to a designated professional technician for repair.

⑦ The working environment of this charger is: -20℃~75℃;

⑧ The storage temperature of this charger is: -25℃~85℃;

⑨ The relative humidity for working and storage is: 0%~95% (no condensation).

2. Installation Guide

1) On any flat and solid wall indoors that is not exposed to rain, fix the pendant A to the wall through four ø5 holes with suitable screws (or steel nails), as shown in Figure 2.1:

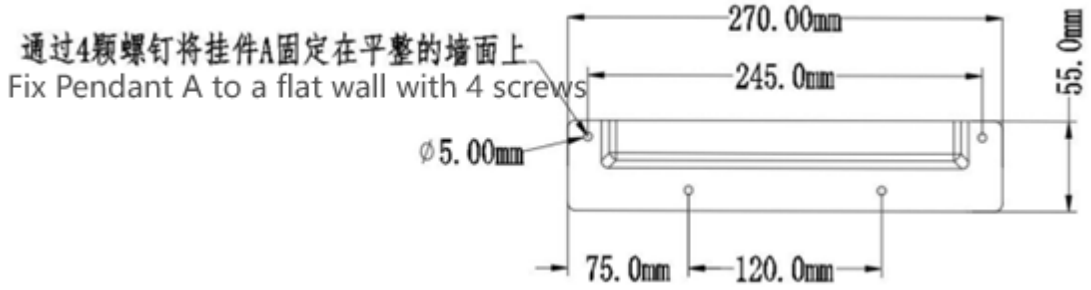


Figure 2.1 Hanging piece A is fixed on the wall:

2) Install pendant B and pendant C on the corresponding positions on the charger using the M3 countersunk screws inside the packaging box and tighten the screws, as shown in Figure 2.2.

Figure 2.2 Pendant B and Pendant C are fixed on the charger

3) Hang the charger body with pendants B and C installed on the wall by matching pendant B with pendant A fixed on the wall, as shown in Figure 2.3:

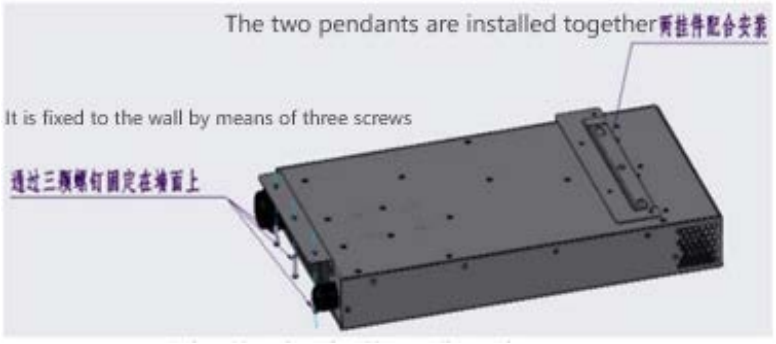


Figure 2.3 The charger is hung on the wall and fixed with pendant C

5) After ensuring that the charger is firmly and reliably fixed on the wall (there will be no shaking when cranked by hand), connect the charger AC input line to the AC mains. The yellow-green ground wire in the charger AC input line is directly connected to the ground wire of the distribution cabinet; when connected to three-phase mains, the three input lines of the charger are connected to the A, B, and C three-phase inputs of the circuit breaker through the circuit breaker or directly, and the three live wires do not need to distinguish the line sequence; when connected to single-phase mains, any two input lines of the charger are connected to the L and N inputs of the circuit breaker through the circuit breaker or directly, and the remaining input line is wrapped with electrical tape and

left hanging. As shown in Figure 2.4;

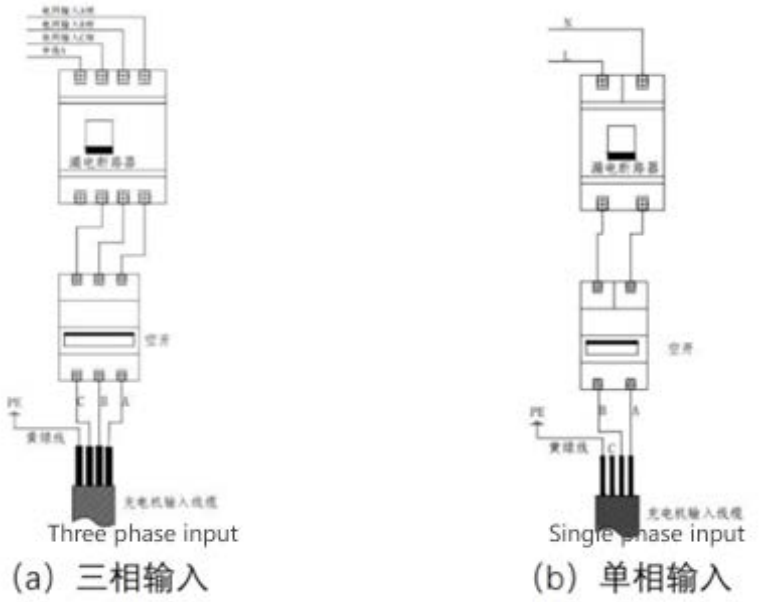


Figure 2.4 Charger input wiring diagram

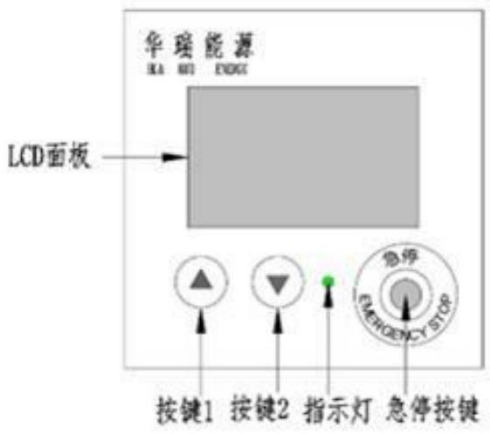
Note:

① To ensure that the charger is firmly hung on the wall, it is recommended to use expansion screws to fix the charger on the wall of the brick-concrete structure;

② It is recommended that a professional electrician with an electrician certificate complete the wiring work.

3. Charger panel operation instructions

As shown in the figure below, the panel of the charger includes an LCD display, two function buttons, an emergency stop button and an RGB three-color LED light. The two function buttons can change the content displayed on the LCD screen and perform setting operations; the emergency stop button is used for emergency shutdown; the RGB three-color LED light is used to indicate the working status of the charger. When the LED light is blue and always on, the charger is in standby mode; when the LED light is green and flashing, it is in charging mode; when the LED light is green and always on, it is fully charged; when the LED light is red and always on, it is in fault mode.

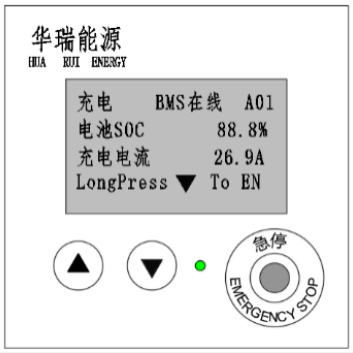


华瑞能源	Hua Rui Energy
LCD 面板	LCD Panel
按键 1	Button 1
按键 2	Button 2
指示灯	Indicator Light
急停按键	Emergency stop

Figure 3.1 LCD panel and buttons

The LCD panel displays a total of five pages, the specific contents are as follows:

1) First page (default page):



华瑞能源	Hua Rui energy
充电	Charging
BMS 在线	BMS online
电池 SOC	Battery SOC
充电电流	Charging Current

First line: When in fault state, the specific fault is directly displayed (see Section 1.3 for details). When not in fault state, the left part displays standby or charging, as well as BMS online or BMS offline; the right part displays the address of the charger, such as A01 for address 1 and A02 for address 2;

First line: Charging BMS online A01; Second line: Battery soc xx.x % (battery temperature xx.x ℃);

Third line: Charging current xx.x A (charging voltage xx.x V); Fourth line: LongPress▼To EN (charging time xx.x minutes);

Note: The display content of the second line switches between battery soc and battery temperature; the display content of the third line switches between charging current and charging voltage; the display content of the fourth line switches between "LongPress▼To EN" and charging time; the switching time of the three lines of display content is 3.6 seconds.

When the LCD screen is on the first page, press ▼ for about 2.5s, and the LCD screen will switch to English display mode.

2) Second page (settings page):

华瑞能源	Hua rui energy
设定电压	Set the voltage
设定电流	Set the current
设定开机延时 00 时 00 分	Set the boot delay to 00:00
长按▲进入设置	Long press ▲ to enter the settings
急停	Emergency stop

First line: Set voltage xx.x V; Second line: Set current xx.x A;

Third line: Power-on delay xx hours xx minutes; Fourth line: Long press ▲ to enter settings;
3) Third page:

	华瑞能源	Hua rui energy
	电池故障代码	Battery failure codes
	模块温度	Module temperature
	急停	Emergency stop

First line: Battery fault code xx; Second line: Module temperature xx.x ℃;
Third line: AB xxx V BC xxx V; Fourth line: CA xxx V Fq xx Hz;
4) Page 4:

	华瑞能源	Hua rui energy
	急停	Emergency stop

First line: IA xx A PBUS xxx V; Second line: IC xx A NBUS xxx V;
Third line: FIN-DC xx ℃; Fourth line: FIN-PFC xx ℃;
5) Page 5:

	华瑞能源	Hua Rui Energy
	累计充电时间	Cumulative charging time
	0010 小时 25 分钟	0010 hours 25 minutes
	输出 80.0V	The output is 80.0V
	电池 80.0V	Battery 80.0V
	急停	Emergency Stop

First line: charger version date; second line: cumulative charging time;

third line: xxxx hours xx minutes; fourth line: output xxV battery xxV;

The key operation instructions of the charger are as follows:

Functional items	Instructions	Remark
Page Switching	Click ▲ or ▼ to switch pages	
Parameter settings	1) Press and hold ▲ for about 2.5 seconds to enter the parameter setting interface; 2) Click ▲, the LCD screen will switch between the voltage setting interface, current setting interface, power-on delay time setting interface and cut-off soc setting interface; 3) Click ▼ to activate the parameter setting function, the digit that can be set will flash, then click ▲ to select the digit to be modified, and click ▼ to change the digit value; 4) After the setting is completed, press and hold ▲ for about 2.5 seconds to save the setting, otherwise the setting will be invalid	1) After the setting is saved, you need to wait for the LCD screen to return to the default page before you can set it again; 2) After the battery soc reaches the set cut-off soc value, the charger will shut down. You need to send a shutdown command to the charger to exit this state
Emergency stop protection	1) Click the "Emergency Stop" button to shut down the charger and enter the emergency stop state; 2) Click ▲ to exit the emergency stop state	After exiting the emergency stop state, the charger is in the shutdown state
Wake up the screen	Click ▲ or ▼	If the charger status does not change for more than 2 minutes, the LCD screen will go into off state.
Manual power on/off	Press and hold ▲ and ▼ for about 2.5 seconds to manually turn the machine on and off without BMS.	Manually turning the machine on and off is a relatively dangerous operation and may damage the battery. If you need to perform this operation, please do so under the guidance of a professional.

	华瑞能源	Hua Rui Energy
	参数设置中	Setting configuration
	设定开机延时的时间	Set the time of the boot delay
	00 小时 00 分钟	00 hours 00 minutes
	▲翻页	Flip the page
	▼设置	Setting

Figure 1.7 Voltage setting screen

	华瑞能源	Hua Rui energy
	参数设置中	Setting configuration
	设定电流	Setting current
	长按▲保存设置	Long press ▲save the setting
	▲翻页	Flip the page
	▼设置	Setting
	急停	Emergency stop

Figure 1.8 Current setting screen

	华瑞能源	Hua Rui Energy
	参数设置中	Setting the configuration
	设定电压	Setting the voltage
	长按▲保存设置	Long press ▲save the setting
	▲翻页	Flip the page
	▼设置	Setting
	急停	Emergency stop

Figure 1.9 Power-on delay time setting screen

Figure 1.10 soc setting screen	Figure 1.11 SOC reaches the set value screen	Figure 1.12 Module emergency stop screen

The fault display and troubleshooting methods of the charger are as follows:

Fault display	Cause	Troubleshooting
Battery voltage failure	The battery is connected reversely, short-circuited or broken.	1) Check if the battery pack is connected correctly 2) Check if the charger is connected correctly 3) Check if the individual batteries in the battery pack are damaged
Output overcurrent fault	Output current is too large	Disconnect the charger AC input and reconnect it after 1 minute. If the fault persists, call the after-sales service hotline to contact the manufacturer.
Module over temperature fault	Charger high temperature protection	1) If the charger's ambient temperature is too high or the radiator temperature is too high, the charger will shut down and enter high temperature protection mode. Please operate the charger in a well-ventilated environment; 2) Disconnect the charger's AC input power supply and wait 15-20 minutes before reconnecting the power supply.
Battery over temperature fault	Battery high temperature protection	1) When the battery temperature exceeds the preset value, the charger will shut down the output to prevent the battery from overheating; 2) When the battery temperature drops, the charger will automatically restart
Output overvoltage fault	The charger output voltage is too high	1) First check whether the voltage level of the charger matches that of the battery. If not, replace the charger or battery. 2) If they match, disconnect the AC input of the charger and power it on again after 1 minute. If the fault persists, call the after-sales service hotline to contact the manufacturer.
Output undervoltage fault	The charger output voltage is too low	1) Observe the battery voltage through the charger LCD screen. If the battery voltage is too low, it means the battery is faulty. 2) If the battery voltage is within the normal output voltage range of the charger, disconnect the charger AC input and power it on again after 1 minute. If the fault persists, call the after-sales service hotline to contact the manufacturer.
AC input failure	The charger input voltage is too high or too low, the input phase is missing or	1) Check whether the AC input line connection is normal, and use a multimeter to measure whether the three-phase AC input line voltage is normal;

	the input current is too high, or the input frequency is abnormal.	2) If there is no abnormality, disconnect the charger AC input, wait 15-20 minutes and then power it on again. If the fault still persists, call the after-sales service hotline to contact the manufacturer.
Fan failure	The charger fan does not rotate or rotates abnormally	1) If you find that a fan of the charger does not rotate, you can disconnect the AC input of the charger and wait for 1 minute, then use tweezers or other sharp objects to move the fan of the charger to see if there is any foreign object stuck; 2) Reconnect the AC power. If the fault still exists, you can call the after-sales service phone to contact the manufacturer.
Internal fault of charger	Internal fault of charger	Disconnect the AC input and power it on again after 1 minute. If the fault persists, call the after-sales service hotline to contact the manufacturer.

4. Wall mounted charger product specifications

Model		HRNYAD5K2_80	HRNYAD10K4_80	HRNYAD16K_80	HRNYAD9K6_48
DC Output	Rated voltage	80V	80V	80V	80V
	Rated current	65A	130A	200A	200A
	Voltage range	36V~100V	36V~100V	36V~100V	24V~60V
	Current adjustment range	0.1A~65A	0.1A~130A	0.1A~200A	0.1A~200A
	Maximum Power	5200W	10.4KW	16KW	9600W
	Voltage stabilization accuracy	≤±1%			
	Steady flow accuracy	≤±1%			
	Reverse polarity	Automatic protection			
	Short Circuit	Automatic protection			
AC Input	Voltage range	270~460V			
	frequency	47~63Hz			
	Maximum current	10.5A	21A	30A	19.5A
	Rated power factor	≥0.99			
	Rated THDI	≤5%			
Dimensions (mm)		460*280*55	515*300*55	520*345*65	515*300*55

5. Charger Instructions

Instructions for use with BMS

1) Close the AC input circuit breaker of the charger;

2) After the LCD screen on the charger lights up, insert the charger output plug into the battery socket (make sure the charger output plug and battery socket are reliably connected);

3) When charging is complete or you want to stop charging, first disconnect the AC input circuit breaker on the charger, and then unplug the charger output plug after the LCD screen on the charger goes off.

Instructions for use without BMS

1) Close the AC input circuit breaker of the charger;

2) After the LCD screen on the charger lights up, set the charging voltage and charging current according to the method in Chapter 3 (please consult the battery manufacturer for setting the charging voltage and charging current; the charging voltage and charging current can be saved after power off. If the battery is not replaced, it only needs to be set once, and this step can be skipped for subsequent charging);

3) Insert the output plug of the charger into the socket of the battery (make sure that the output plug of the charger and the battery socket are reliably connected), and then manually start the charger according to the method in Chapter 3;

4) After charging is completed or you want to stop charging, first disconnect the AC input circuit breaker on the charger, and then unplug the output plug of the charger after the LCD screen on the charger goes off;

5) Manual startup is a relatively dangerous operation, and you need to communicate with the battery manufacturer before performing this operation.

6 Instructions

6.1 New forklift running-in

In the initial stage of use, the forklift should be operated under low load, especially within 100 hours, and the following requirements should be met:
– New batteries must be prevented from over-discharging during initial use.
– Generally, they should be charged in time when they are 80% discharged.
– The prescribed preventive maintenance should be thorough.
– Avoid sudden braking, sudden opening or sharp turns.
– Change oil or lubricate in advance as required.
– Limit the load weight to 70% to 80% of the rated load.

6.2 Pre-operation inspection and adjustment

For the safe operation of the forklift, the forklift must be inspected and adjusted accordingly before operation.

Warning

① If the forklift or attachments are found to be damaged or have safety hazards during the inspection, the forklift must not be used until they are repaired in accordance with regulations.

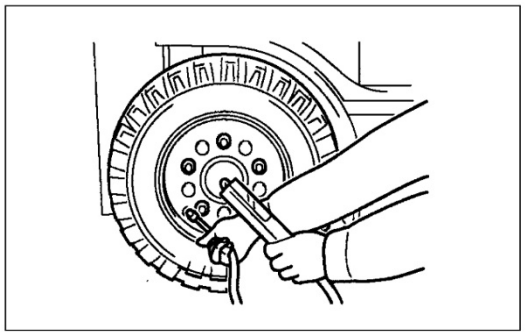
② In addition to testing the lights and checking the operating performance, the key switch must be turned off and the battery plug must be unplugged before checking the electrical system.

– Visually inspect the truck, paying special attention to the wheels, wheel bolts and load-carrying parts for damage or looseness.
– Visually and manually check the drive axle, hydraulic system, brake system and lithium battery for leaks or damage.
– Check tire pressure: Use a pressure gauge to check whether the tire pressure is within the specified value (front wheel 0.9 MPa / rear wheel 0.8 MPa).
– Check whether the lithium battery box is locked.
– Check whether the driver's seat is functioning properly and adjust the seat position according to the actual situation of the driver.
– Adjust the front and rear and up and down position of the armrest control device according to the driver's own situation.
– Check whether the seat belt is functioning properly: the seat belt must be locked when it is pulled out quickly.
– Adjust the steering column inclination.
– Adjust the field of view of the rearview mirror.
– Check whether the lifting chain is evenly tensioned.
– Check the function of the operating and display elements.
– Check whether the instrument display is functioning properly.

– Check the function of the seat switch: the driver does not sit properly in the seat, the seat switch indicator light on the instrument panel lights up, and the hydraulic function must not be operated at the same time.
– Check the function of the steering system.
– Check whether the brake pedal functions normally.
– Check the accelerator pedal: when the accelerator pedal is pressed, the acceleration is clear with the change of travel, and the return is good.
– Check the steering angle display: turn the steering wheel in both directions to the gear position, and check whether the wheel position is displayed on the instrument panel.
– Check whether the hydraulic functions of lifting/lowering, tilting and attachments are normal.
– Check whether the functions of electrical components such as lights, horns, and reversing buzzers are normal.

Check tire pressure (pneumatic tires only)

Unscrew the cap counterclockwise and measure the tire pressure with a pressure gauge. If it is insufficient, add the pressure to the specified value. After confirming that there is no leakage, screw on the cap and check whether the contact surface and side of the tire are damaged and whether the rim is deformed.



Attention

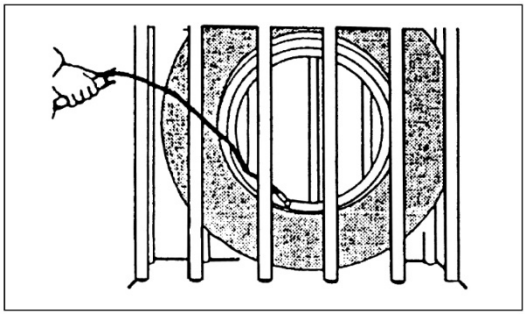
① Forklift tires require very high air pressure to carry loads. Even the slightest deformation of the rim or damage to the tire contact surface can cause an accident.

② When using an air compressor, the pressure should be adjusted first, because the maximum output pressure of the air compressor is much higher than the specified pressure of the tire. Otherwise, serious accidents may occur.

Required tire pressure (adopting the new standard GB/T2982-2001)

Model	Front wheel	rear wheel
3.0t～3.8t	0.9 MPa	0.8 MPa
2.0t～2.5t	0.86 MPa	0.86 MPa

Note: The above pressures are for pneumatic tires and are not applicable to solid tires.



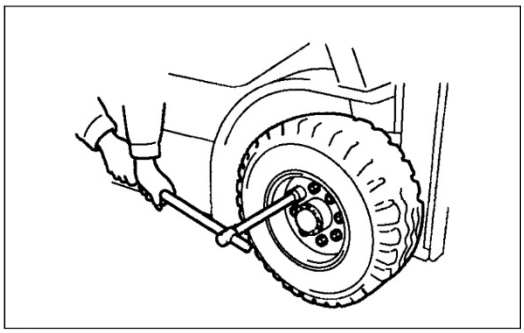
Attention

① After the tire and rim are assembled, all bolts and nuts should be tightened to the specified torque value before the tire can be inflated. After inflation, the tire has expansion energy, and the tire pressure should not exceed the specified value.

② To ensure safety, place the tire in a protective frame or tie the tire with an iron chain when inflating.

Check the wheel fixation

Check whether the tightening torque of the front and rear wheel nuts meets the requirements.



Procedure:

– Park the truck as required.

– Use a torque wrench to tighten the wheel nuts crosswise. See the table below for tightening torque.

Model	Front wheel nut（Nm）	Rear wheel nut（Nm）
2.0t～3.8t	441-588	157-176

Brake pedal inspection

Operation steps:

– Press the brake pedal and check if there is any sluggishness or jamming.

– The correct braking distance when unloaded is 2.5 meters.

– Adjust the pedal height: adjust the limit bolt so that the distance between the midpoint of the upper surface of the pedal pad and the front bottom plate is 115 mm to 125 mm.

– Adjust the length of the brake master cylinder push rod so that the pedal idle travel is 1mm to 3mm.

– When the brake pedal is gradually pressed down 10mm to 20mm, the brake light switch should be fully turned on.

Handbrake lever inspection

The operating force is adjusted by the top screw of the rod. Turning it clockwise increases the operating force, and vice versa.

Make sure the handbrake handle works well when it is tightened and then released to return to its original position.

Note

Depressing the brake pedal will help tighten or loosen the handbrake lever.

Brake Fluid Check

Open the brake oil cup cover and check whether the brake fluid level is within the scale range. If the fluid level is insufficient, please add more and check whether there is air mixed in the brake line.

Note

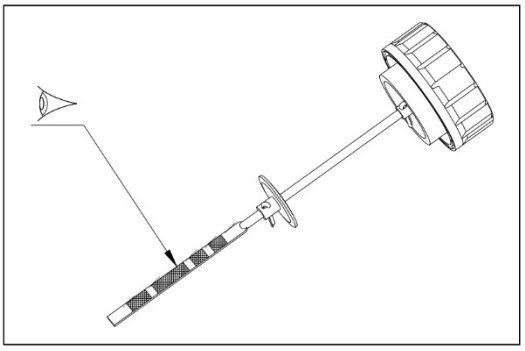
① Please use pure brand brake fluid, do not mix different brands of brake fluid.

② Do not splash brake fluid on any painted surface, otherwise it will damage the paint.

③ When adding brake fluid, prevent dust and water from mixing into the oil.

Hydraulic oil inspection

Open the rear floor, loosen the hydraulic oil filling port cap at the right rear, pull out the dipstick, and check whether the oil level is between the scales. If insufficient, add more oil.



Different mast lifting heights correspond to the oil dipstick level heights:

"30" means: hydraulic height when the lifting height H≤3.0m

"40" means: hydraulic height when the lifting height H≤4.0m

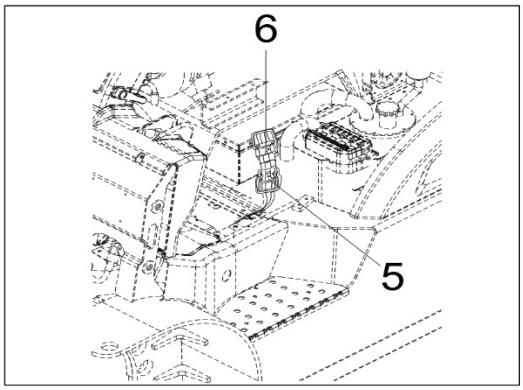
"50" means: hydraulic height when the lifting height H≤5.0m

"60" means: hydraulic height when the lifting height H≤6.0m
"65" means: hydraulic height when the lifting height H≤6.5m

Battery inspection

Check whether the battery is firmly installed. That is, whether the battery is firmly fixed.

Check whether the plug and socket are loose or damaged, otherwise they should be adjusted or replaced.



Check the mast and forks

– The forks have no cracks or bends, and are securely and correctly installed on the fork frame;

– Check the oil cylinder and oil pipe for oil leakage;

– Check the rotation of the rollers;

– Check the mast for cracks and deformation;

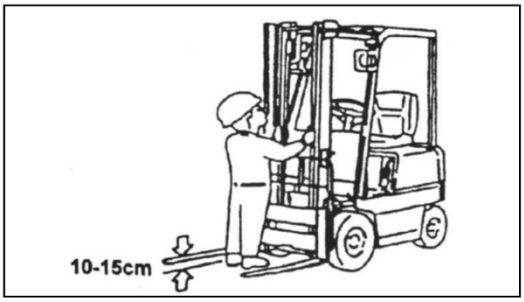
– Operate the lifting, tilting and attachment handles to check whether the mast is working properly and whether there are any abnormal sounds.

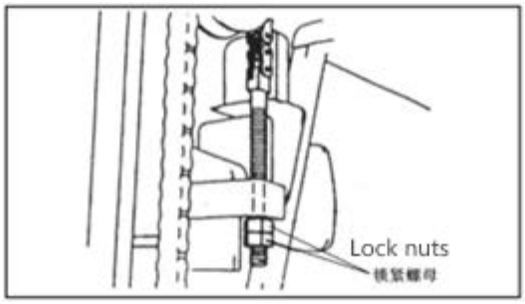
Chain tension check

– Raise the fork 10cm to 15cm and keep the mast vertical.

– Press the middle of the chain with your thumb to check whether the tension of the left and right chains is consistent.

– Adjust the tension: Loosen the locking nut, turn the adjusting nut to adjust the chain so that the tension of the two chains is consistent, and then tighten the locking nut.





6.3 Operate a forklift

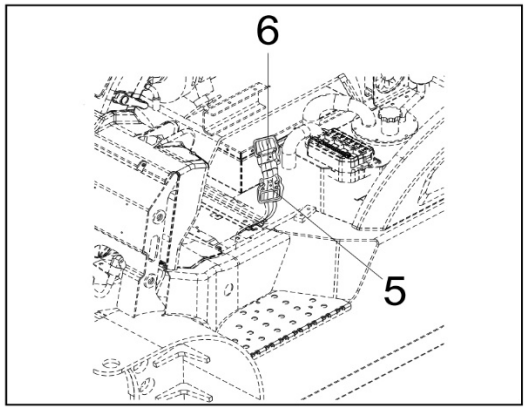
Drive and Operation

Warning

If the forklift is damaged or malfunctions in any way, it is prohibited to start the forklift before it is repaired.

Drive

- Open the hood, plug in the battery and close the hood.



– Release the emergency stop switch. Turn the emergency stop switch clockwise to a certain angle, and the button will pop up automatically.

– Reverse the joystick to the neutral position.

– Insert the key into the switch lock and turn it right to the “ Ⅰ ” stop position.

– The forklift enters a 3-4 second self-check procedure. After the self-check is completed, the display shows the available battery power.

Attention

The forklift will automatically enter the self-checking program (about 3-4 seconds). The display screen will show the welcome interface and all 6 indicator lights will light up. During this period, the forklift cannot travel or lift. If the direction switch, accelerator pedal or lifting switch are operated during this period, a fault message will appear on the display screen and the fault indicator light "  " will light up.

- Hold the steering wheel handle tightly with your left hand and turn on the key switch with your right hand.
- Mast tilt backward
- Operate the lifting lever to raise the forks to 150 mm to 200 mm from the ground. Operate the tilt lever to tilt the mast backward to the bottom.
- Operate the reversing lever
- When the forklift moves forward: push the reversing lever forward.
- When the forklift moves backward: push the reversing lever backward.
- Release the handbrake lever.
- Press the brake pedal and push the handbrake lever to the forward position.
- Hold the steering wheel handle with your left hand and place your right hand lightly on the steering wheel.

Start

Slowly depress the accelerator pedal and the forklift will move forward or backward.

slow down

Slowly release the accelerator pedal and the forklift will slow down.

Note

Slow down the forklift in the following situations:

① When turning
② When approaching cargo or pallets
③ When approaching a stacking area
④ When entering a narrow passage
⑤ When the ground or road conditions are poor

warning

Do not press the accelerator and brake pedals at the same time.

Steering

Unlike ordinary vehicles, forklifts have rear-wheel steering, and the rear counterweight rotates outward when turning.

Slow down and turn the steering wheel to the side you want to turn. The steering wheel should be turned slightly earlier than that of vehicles with front-wheel steering.

Notice

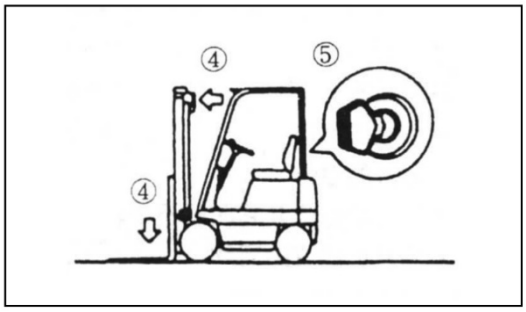
Drive slowly and carefully operate the steering wheel, and make sure that there is enough swing behind the forklift.

parking

— Slow down and press the brake pedal to stop the vehicle.
— Put the shift handle in neutral.
— Apply the handbrake.
— The forks are on the ground and the mast is tilted forward to the maximum.
— Turn the key switch to the "OFF" position, unplug the battery plug, and remove the key for safekeeping.

attention

① Get off the vehicle carefully and don't jump out.
② Vehicles cannot stop on the route.



Load

─ Adjust the distance between the forks to balance the cargo.

─ The vehicle faces the cargo for easy loading.

─ The pallet should be placed symmetrically on the two forks.

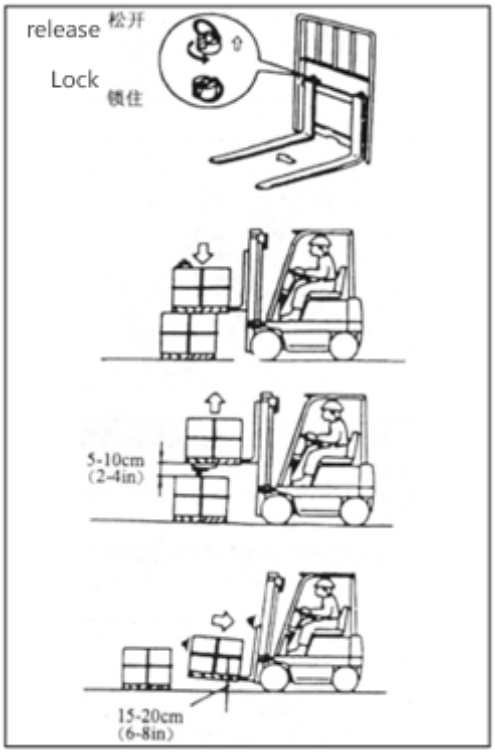
─ The forks should be as far as possible into the pallet.

─ Lifting the cargo:

- First lift the forks 5cm to 10cm off the ground to confirm whether the cargo is secure.

- Then tilt the mast back to the right position, lift the cargo 5cm to 10cm off the ground, and then start driving.

─ Carrying large cargo will obstruct the view. In addition to climbing a slope, drive in reverse.



Stacking

─ Slow down when approaching the cargo storage area.

─ Stop the vehicle in front of the cargo storage area.

─ Check the condition of the storage area.

─ Tilt the mast forward to the level of the forks, and lift the forks slightly above the unloading position.

─ Go forward, place the cargo above the unloading position, and then stop.

─ After confirming that the cargo is directly above the unloading position, slowly lower the forks, and then confirm that the cargo is safely in place.

─ Perform necessary lifting and tilting operations, and back up the forklift to withdraw the forks from the cargo.

─ After confirming that the fork tips have left the cargo, lower the forks to a position 15cm to 20cm above the ground.

─ Tilt the mast backward to the position.

Attention

Slow down the forklift in the following situations:

① When turning;
② When approaching cargo or pallets;
③ When approaching a stacking area;
④ When entering a narrow passage;
⑤ When the ground or road conditions are poor.

warning

① Do not tilt the mast when the load is lifted more than 2m.
② Do not get off or leave the vehicle when the load is at a high place

Destacking

─ When the forklift approaches the pickup location, slow down.
─ Stop the forklift when it is 30cm away from the cargo.
─ Check the cargo condition.
─ Tilt the mast forward until the forks are level, and lift the forks to the pallet or sleeper position.
─ Make sure the forks are aligned with the pallet, move forward slowly, and stop the forklift after the forks are inserted into the pallet as far as possible.

Attention

If it is difficult to fully insert the fork, move the vehicle forward to insert the fork 3/4. Lift the fork 5cm to 10cm, move it back 10cm to 20cm, then drop the pallet or sleeper, and then move forward to fully insert it.

─ Lift the fork 5cm to 10cm from the stack.
─ Look around the vehicle, confirm that there are no obstacles, and slowly back up.
─ Lower the fork 15cm to 20cm from the ground, tilt the mast back to the correct position, and then transport to the destination.

Post-operation inspection

After use, the forklift should be cleaned and inspected as follows:

- Check for damage or oil leakage.
- Add lubricant as needed.
- Check if the tire is damaged or has foreign matter embedded in it.
- Check if the wheel nut is loose.
- Check the electrolyte level.
- If the fork is not raised to the maximum height during the operation, it should be raised to the maximum height 2 to 3 times after the operation is completed.

Attention

① If any fault is found, it should be repaired in time.
② It is strictly forbidden to put the forklift into use before it is completely repaired.

7 Maintenance

Careful and thorough maintenance can keep the forklift in good working condition. Ensuring the safety of the forklift means ensuring the safety of your work and life.

7.1 Maintenance Summary

– Forklifts need regular inspection and maintenance to keep them in good performance condition.
– Inspection and maintenance are often easily overlooked. Find problems as early as possible and solve them in time.
– Use genuine spare parts from the Noli Group.
– When replacing or refueling, do not use different types of oil.
– Replaced waste oil and battery waste fluid cannot be dumped at will, and should be disposed of in accordance with local environmental laws and regulations.
– Develop a comprehensive maintenance and repair plan.
– Complete records should be made after each maintenance and repair.
– It is forbidden to repair forklifts without training.
– Users can only arrange for modifications or conversions of powered industrial forklifts if the forklift manufacturer is no longer in business and there are no successors interested in the business, but the premise is that the user
(a) arrange for the modifications or alterations to be designed, tested and implemented by engineers expert in industrial trucks and their safety,
(b) maintain permanent records of the design, testing and implementation of the modifications or alterations;
(c) approve and make appropriate changes to capacity plates, decals, labels and instructions;
(d) affix a permanent and easily visible label to the truck indicating how the truck has been modified or altered, the date on which the modification or alteration was made and the name and address of the organization that performed those tasks.
Attention
① Fireworks are strictly prohibited!
② Before maintenance, turn off the key switch and unplug the battery plug. (Except for partial obstacle removal inspection).
③ Clean the electrical parts with compressed air, never with water.
④ Do not put your hands, feet or any part of your body between the door frame and the instrument frame.

Counterweight weight:

tonnage	2.0t	2.5t	3.0t	3.5t	3.8t
Counterweight weight	1110kg	1400kg	1700kg	2000kg	2200kg

7.2 Regular maintenance schedule

0 — Check, calibrate, adjust × — Replace

Electrical system

Battery

Maintenance Project	Maintenance content	tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Battery	Battery installation tightness		○	○	○	○	○
	Battery charging socket cleaning				○	○	○
	Check if the contacts of the battery charging socket are damaged or corroded.		○	○	○	○	○
	Is there water on the battery charging socket contact? Clear it.		○	○	○	○	○
	Is the dust cover of the battery charging socket intact?				○	○	○
	Is the battery casing damaged?		○	○	○	○	○
	Battery power		○	○	○	○	○
	Stay away from fireworks		○	○	○	○	○

Controller

Maintenance Project	Maintenance content	tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Controller	Check the contact wear					○	○
	Check whether the contactor mechanical movement is good					○	○

	Check whether the pedal micro switch operates normally					○	○
	Check whether the connection between the motor, battery and power unit is good.					○	○
	Check controller failure to determine whether the system is normal						First 2 years

Motor

Maintenance Project	Maintenance content	tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000 h)
Motor	Remove foreign matter from the motor housing				○	○	○
	Clean or replace bearings					○	○
	Is the wiring correct and secure?				○	○	○

Electrical system other

Maintenance Project	Maintenance content	tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Emergency power off button	Working and installation status			○	○	○	○
Seat Sensing System	Working and installation status			○	○	○	○
Rocker Switch	Rear headlight						
Reversing switch	Working and installation status			○	○	○	○
Combinat	Working condition of left			○	○	○	○

ion switch (turn, light)	and right steering switch						
	Lighting position and working status			○	○	○	○
Trumpet	Working and installation status		○	○	○	○	○
Lamps and Bulbs	Working and installation status		○	○	○	○	○
Reverse buzzer	Working and installation status		○	○	○	○	○
Meter	Instrument working condition		○	○	○	○	○
electric wire	Wiring harness damage or loose fixation			○	○	○	○
	Loose circuit connection				○	○	○

Body system

Maintenance Project	Maintenance content	Tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Frame and side doors	Is the frame cracked?				○	○	○
	Is the right door lock assembly working properly?		○	○	○	○	○
	Is the right door open properly?				○	○	○
	Protection bar fastening		○	○	○	○	○
	Is the roller under the battery		○	○	○	○	○
Guard Top Frame	Is the installation firm?	Detection hammer	○	○	○	○	○
	Check for deformation, cracking, and damage		○	○	○	○	○

Drivetrain

Maintenance Project	Maintenance content	tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Drive axle assembly	Is there noise?		○	○	○	○	○
	Check for leaks		○	○	○	○	○
	Change the oil in the axle					First three	

	housing (gear oil)					months, then every six months	
	Check wheel bearing looseness and noise			○	○	○	○
	Check for deformation, cracks or damage to the bridge				○	○	○

Wheels (front and rear)

Maintenance Project	Maintenance content	Tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Tire	Inflation pressure	Barometer	○	○	○	○	○
	Wear, cracks or damage		○	○	○	○	○
	Are there any nails, stones or other foreign objects on the tire?				○	○	○
	Rim damage		○	○	○	○	○
	Split rim bolt looseness	Detection hammer	○	○	○	○	○

Steering system

Maintenance Project	Maintenance content	Tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)

Steering wheel	Check clearance		○	○	○	○	○
	Check for axial looseness		○	○	○	○	○
	Check radial looseness		○	○	○	○	○
	Checking the operating status		○	○	○	○	○
Steering gear	Check if the mounting bolts are loose				○	○	○
Rear axle steering knuckle	Check if the kingpin is loose or damaged				○	○	○
	Check for bends, deformations, cracks or damage				○	○	○
	Check the installation	Detection hammer			○	○	○
Steering cylinder	Check operation		○	○	○	○	○
	Check for leaks		○	○	○	○	○
	Check whether it is loose during installation and hinge connection				○	○	○

Braking system

Maintenance Project	Maintenance content	Tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Brake pedal	Empty trip	Scale	○	○	○	○	○
	Pedal travel		○	○	○	○	○
	Operation		○	○	○	○	○
	Is there air in the brake line?		○	○	○	○	○
Parking brake operation	Is the brake safe and reliable and has sufficient travel?		○	○	○	○	○
	Maneuverability		○	○	○	○	○
Rods, cables, etc.	Maneuverability				○	○	○
	Is the connection loose?				○	○	○
	Wear condition of the joint connected to the reduction gearbox					○	○
Pipeline	Damage, leakage, rupture				○	○	○
	Connection, clamping position, looseness				○	○	○
Brake master cylinder Slave	Leakage		○	○	○	○	○
	Check oil level, change oil		○	○	○		×
	The operation of the master pump and slave pump					○	○
	Leakage and damage of					○	○

cylinder	master pump and sub-pump						
	The master cylinder, slave cylinder piston leather cup, and one-way valve are worn or damaged and need to be replaced.						×

Hydraulic system

Maintenance Project	Maintenance content	Tool	Every day (8h)	Weekly (40h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Hydraulic oil tank	Oil level check, oil change		○	○	○	○	×
	Clean the oil filter						○
	Eliminate foreign matter						○
Control valve stem	Is the connection loose?		○	○	○	○	○
	Operation		○	○	○	○	○
Multi-way valve	Oil Leakage		○	○	○	○	○
	Safety valve and tilt-lock valve operation				○	○	○
	Measuring safety valve pressure	Oil pressure gauge					○
Pipeline joints	Leakage, looseness, rupture, deformation, damage				○	○	○
	Replace the tube						× **1-2 years**
Hydraulic pump	Is the hydraulic pump leaking or making noise?		○	○	○	○	○
	Wear condition of hydraulic pump driving gear				○	○	○

Lifting system

Maintenance Project	Maintenance content	Tool	Every day (8h)	Monthly (166h)	Monthly (166h)	3 months (500h)	6 months (1000h)
Chain Sprocket	Check the tension of the chain and whether it is deformed, damaged or corroded.		○	○	○	○	○
	Chain oiling				○	○	○
	Rivet pins and looseness				○	○	○
	Sprocket deformation and damage				○	○	○
	Is the sprocket bearing loose?				○	○	○
Attachments	Check whether the status is normal				○	○	○
Lifting cylinder Tilt cylinder	Check whether the piston rod, piston rod thread and connection are loose, deformed or damaged	Detection hammer	○	○	○	○	○
	Operation		○	○	○	○	○
	Leakage		○	○	○	○	○
	Wear and damage of pin and cylinder steel back bearing				○	○	○
Fork	Fork damage, deformation, and wear				○	○	○
	Damage and wear of positioning pins					○	○

	Cracking and wear of the hook welding part at the root of the fork				○	○	○
Overhead rack and cargo rack	Is the installation firm?	Detection hammer	○	○	○	○	○
	Check for deformation, cracking, and damage		○	○	○	○	○
Mast Fork lift	Check whether the welding places between the inner and outer door frames and the cross beams are cracked or damaged.				○	○	○
	Check whether the welding place between the tilt cylinder bracket and the mast is poor, cracked or damaged.				○	○	○
	Check whether the inner and outer door frames are poorly welded, cracked or damaged.				○	○	○
	Is the fork frame xxxxx poorly welded, cracked or damaged				○	○	○
	Is the roller loose?				○	○	○

	Wear and damage of mast support bearings						○
	Check whether the bolts of the frame support cover are loose.	Detection hammer			0 (First time only)		○
	Are the lifting cylinder piston rod head bolts and bent plate bolts loose?	Detection hammer			0 (First time only)		○
	Cracks and damages on the rollers, roller shafts and welding parts				○	○	○

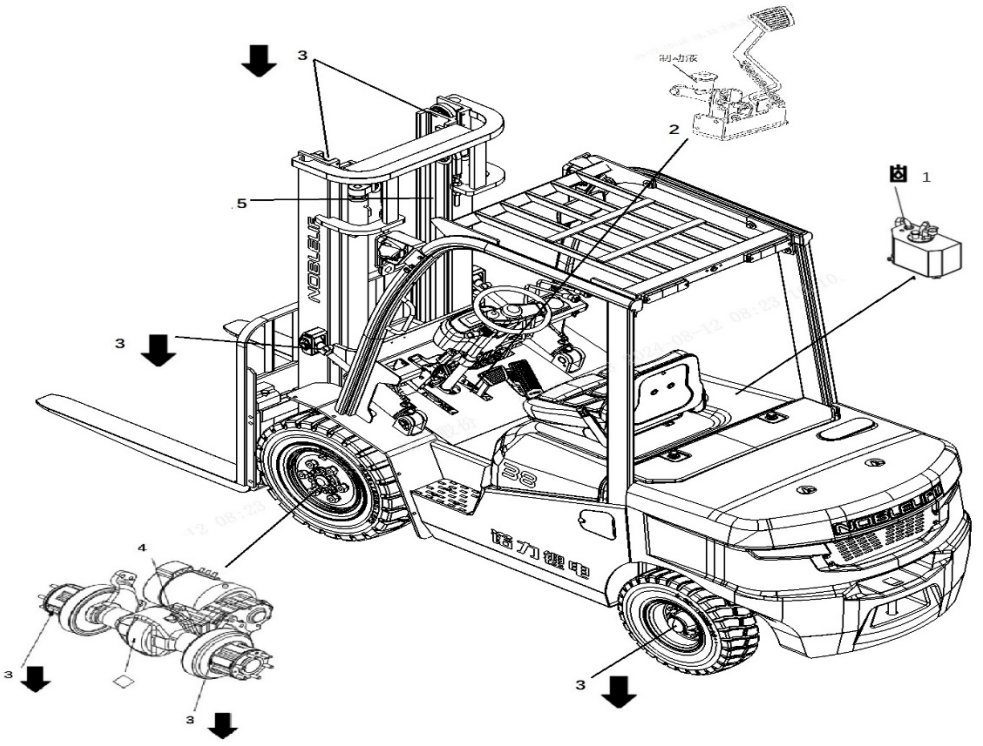
7.3 Regularly replace key safety parts

– Some parts are difficult to detect damage or breakdown through regular maintenance. To further improve safety, users should regularly replace the parts listed in the table below.

– If these parts become abnormal before the replacement time arrives, they should be replaced immediately.

Key safety parts name	**Use life (years)**
Brake hose or tube	1～2
Hydraulic hose for lifting system	1～2
Lifting chain	2～4
High-pressure hoses and hoses for hydraulic systems	2
Brake fluid cup	2～4
Brake master cylinder cover and dust boot	1
Hydraulic system internal seals, rubber parts	2
Steering axle rubber pad	4

7.4 Oil and lubrication for forklifts



No.	Name	Specs	Fuel volume (L)	Remark
1	Hydraulic oil	Ordinary environment: L-HM32 Cold storage/high-cold environment: L-HV32	35～65	Hydraulic oil tank
2	Brake fluid	Choice HZY3 brake fluid (factory fill) or DOT3 brake fluid	≈1.0	Brake oil tank
3	grease	General purpose lithium grease for automobiles		Lubrication surface and lubrication nipple
4	Gear Oil	85W/90（GL-5）	≈4---5	Drive axle and reduction gearbox
5	Anti-rust oil	Chain spray or engine oil		Chain
	Industrial Vaseline	2#		Battery electrode column

Replace hydraulic oil

Hydraulic oil is generally replaced once a year. In dusty environments or vehicles with high usage frequency, it should be replaced six months in advance.

Operation steps:

– Park the forklift safely as required.

– Tilt the mast backward to the bottom and lower the forks to the ground.

– Remove the hydraulic oil tank cap and dipstick assembly (52).

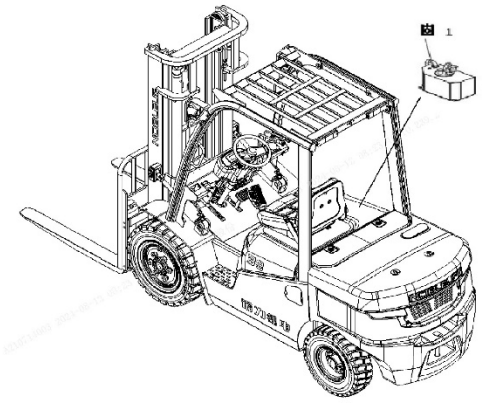
– Place an oil pan under the frame, remove the drain plug (71) and the sealing gasket (72), and drain the old oil;

– Remove the oil pan and dispose of the waste oil in accordance with local environmental regulations. Do not dump it at will;

– Replace the drain plug (71) and the sealing gasket (72), add new hydraulic oil, and check for leaks;

– Start the forklift, raise the forks 3 to 5 times, and tilt the mast forward and backward 3 to 5 times;

Add hydraulic oil to the specified mark.



Different mast lifting heights correspond to the oil dipstick level heights:

"30" means: hydraulic height when the lifting height H≤3.0m

"40" means: hydraulic height when the lifting height H≤4.0m

"50" means: hydraulic height when the lifting height H≤5.0m

"60" means: hydraulic height when the lifting height H≤6.0m

"65" means: hydraulic height when the lifting height H≤6.5m

Mast lubrication

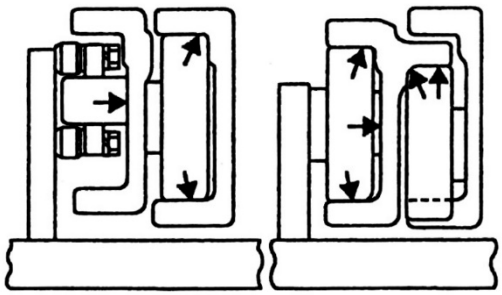
According to the requirements of the regular maintenance and lubrication diagram, apply grease regularly to the inner and outer mast rails.

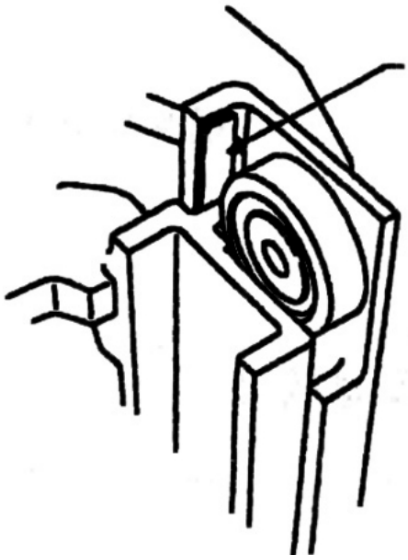
The lubrication interval should be changed accordingly according to the operating conditions. In busy months, the number of lubrication parts should be increased.

In conjunction with the operation of the forklift, apply a layer of grease to the contact surface between the lifting guide wheel and the inner and outer masts.

Warning

When adding grease, park the forklift on a flat surface, turn off the ignition switch and apply the handbrake. Prevent your hands and body from being caught when adding grease, and prevent falling when lubricating at a high position.





Chain lubrication

Use chain spray to spray directly on the chain or use a brush dipped in engine oil to apply to both sides of the chain.

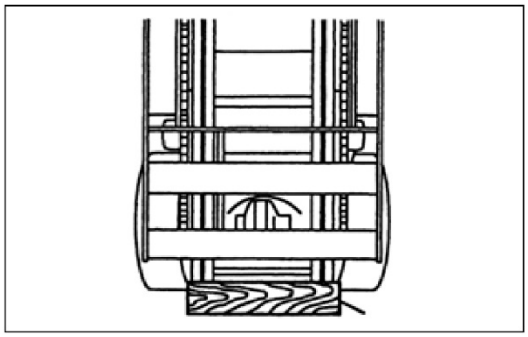
7.5 Changing wheels

When the tires are worn to the limit or damaged, they should be replaced in time, and tires can only be replaced in pairs. After changing tires, check whether the wheel nuts are tight after running for 10 hours.

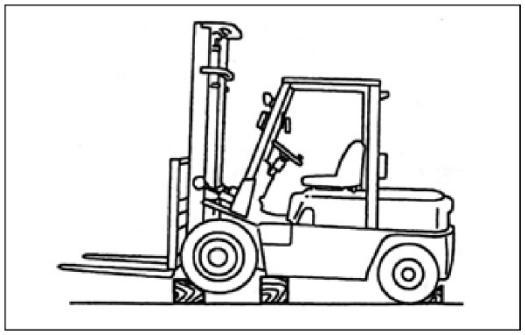
Replace the front wheel

– Park the forklift on a level, solid surface and place wooden pads behind the rear wheels to prevent the forklift from moving.

– Start the forklift and raise the mast by about 100mm. Tilt the mast backward, place wooden pads on both sides of the outer mast, and then tilt the mast forward until the front wheels are lifted off the ground.



– Place wooden blocks on both sides of the front of the forklift frame to support the forklift, and then turn off the key switch.



Warning

① Use appropriate tools, such as wedges, hardwood supports, etc. to secure the forklift to prevent accidental rolling or tipping.

② Make sure the wooden pad used to support the forklift is a whole piece and strong enough.

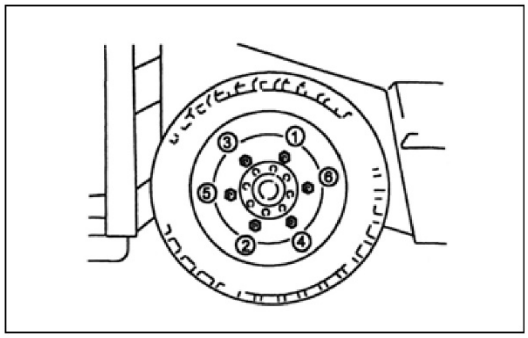
③ Never go under the forklift when the forklift is supported only by wooden pads.

– Loosen the wheel nuts, remove the wheel and replace the tire with a new one.

WARNING:

Do not remove the wheel nut until the rear wheel is lifted off the ground.

Install the new wheel on the wheel hub and tighten the wheel nuts symmetrically and crosswise (T=588Nm～736Nm).



– Start the forklift and remove the wooden pads from under the frame. Tilt the mast backward, slowly lower the forklift, and then remove the wooden pads under the mast at the rear wheel.

Replacing the rear wheel

Warning

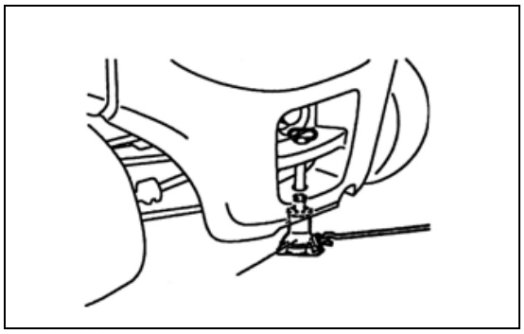
① Only jacks with a minimum rated load of 3000kg may be used.

② Appropriate tools such as wedges, hardwood supports, etc. must be used to secure the jack to prevent the risk of accidental rolling or tipping.

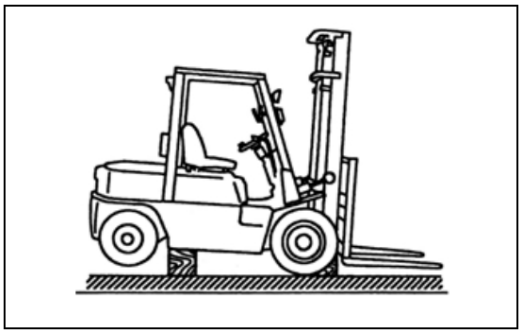
– Park the forklift on a level and solid surface, apply the handbrake, and place wooden blocks behind the front wheels to prevent the forklift from moving.

– Place the jack on the cut surface at the bottom of the counterweight and slowly lift the forklift with the jack until the rear

wheels are completely off the ground.



– Place sturdy wooden blocks under the frame.



Warning

① Make sure the wooden pad used to support the forklift is a whole piece and strong enough.

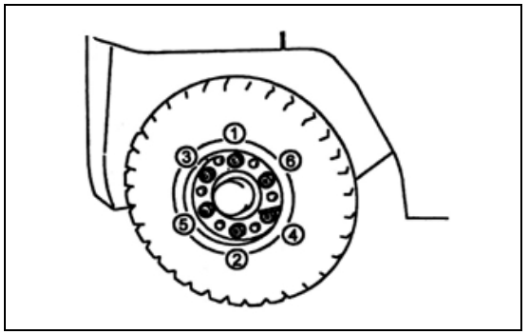
② Never go under the forklift when the forklift is supported only by the wooden pad.

– Loosen the wheel nuts, remove the wheel and replace the tire with a new one.

WARNING

Do not remove the wheel nuts until the rear wheel is lifted off the ground.

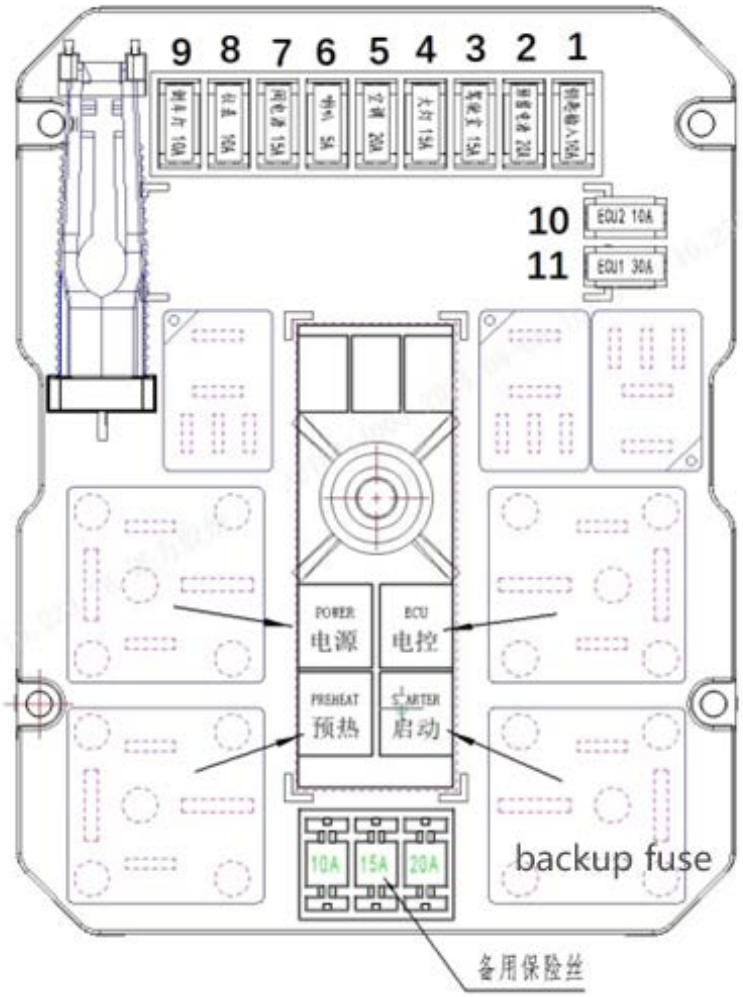
–Install the new wheel on the wheel hub and tighten the wheel nuts symmetrically and crosswise (T=411 Nm ~ 588Nm).



– Remove the wooden blocks under the frame, slowly lower the forklift to the ground, and remove the wooden blocks and jack behind the front wheels.

7.6 Checking and replacing fuses

Fuse parameter table



Fuse location

Fuse list

Location	capacity	Application parts
1	10A	Key input
2	20A	Reserve power supply
3	15A	Cab
4	15A	Headlight
5	20A	air conditioner
6	5A	trumpet
7	15A	Valve power supply
8	10A	meter
9	10A	Reversing lights
10	10A	ECU2
11	30A	ECU1

Fusible Link

A melted fusible link can be easily seen and felt with the touch of a finger. If you are unsure whether it is broken, you can test it with a multimeter or a light bulb.

Attention

1. If the fusible link burns out, it may be due to a short circuit (power or current is too large). Regardless of the reason, please check carefully and troubleshoot.
2. The fusible link will heat up, so do not wrap it with tape. Finally, do not place the fusible link close to other wiring or rubber parts.

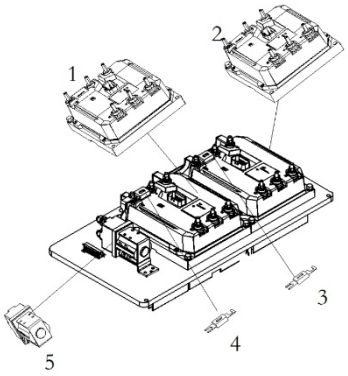
Attention

① Before working on the forklift's electrical system, the battery plug must be unplugged.

② Before working on the forklift's electrical system, the metal accessories on your hands must be removed.
③ When replacing a fuse, please select a fuse with the same specifications as the fuse being replaced.

7.7 Inspection and repair of control system assembly

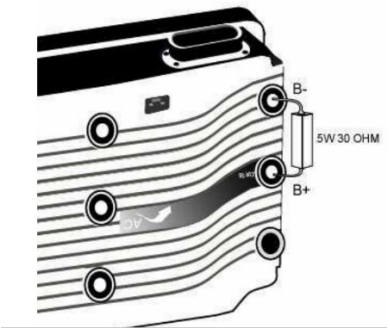
Procedure:
– Park the truck safely and securely.
Open the hood and unplug the battery.
The control system components are exposed and can be inspected, replaced and adjusted.



No.	Name	Control Circuit	Specification
1	Controller	Control drive motor	80V
2	Controller	Control oil pump motor	80V
3	fuse	/	/
4	Fuse	/	/
5	Contactor	/	/

Attention

① Before working on the forklift's electrical system, the battery plug must be unplugged.
② The controller has an accumulator, and B+ and B- cannot be touched by hand to prevent electric shock. To check or clean the controller, please disconnect the power supply of the entire vehicle first, and then connect a load (such as a resistor or a light bulb, etc.) between B+ and B- of the controller to discharge the capacitor in the controller.
③ Before working on the forklift's electrical system, the metal ornaments on your hands must be removed.
④ When replacing a fuse, please select a fuse with the same specifications as the fuse being replaced.
– When repairing the controller’s electronic control, you must first cut off the power supply, then connect a 10-100 ohm resistor to the positive and negative poles of the controller to short-circuit the residual voltage on the capacitor, otherwise there is a risk of electric shock.



– The magnetic field and magnetic radiation of the environment have a certain impact on the normal operation of the inverter. Long-term impact may damage the controller. Therefore, stay away from magnetic fields and magnetic radiation.

7.8 Bolt tightening torque list unit：N·m

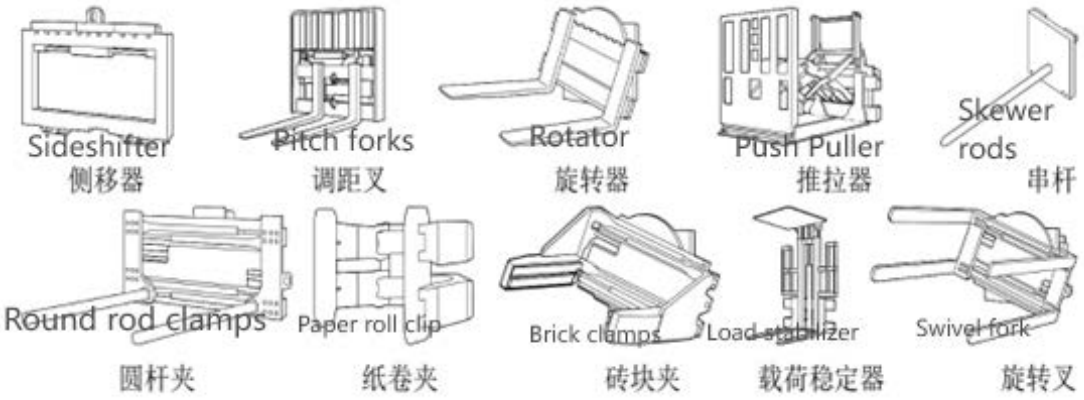
Bolt diameter	grade

	4.6	5.6	6.6	8.8
6	4～5	4～5	4～5	4～5
8	5～7	5～7	5～7	5～7
10	6～8	6～8	6～8	6～8
12	9～12	9～12	9～12	9～12
14	10～12	10～12	10～12	10～12
16	12～15	12～15	12～15	12～15
18	14～18	14～18	14～18	14～18
20	22～29	22～29	22～29	22～29
22	20～25	20～25	20～25	20～25
24	25～31	25～31	25～31	25～31
27	29～39	29～39	29～39	29～39

Note:
– All important joints use 8.8 grade bolts.
– The bolt grade can be found on the head, if not, it is 8.8 grade.

8 **Attachment use, installation and safety rules**

According to the international standard ISO2328 "Forklift hook type cargo and fork frame installation dimensions" requirements, accessories are selected, such as side shifter, adjustable fork, rotator, push-pull device, skewer, etc.



8.1 Installation of accessories

– Any modification of the forklift attachments related to safety and performance is strictly prohibited without the technical permission of our company.
– The actual rated load capacity should be the smallest of the rated load capacity of the forklift, the load capacity of the attachment itself, and the comprehensive load capacity of the vehicle. Generally speaking, the comprehensive load capacity of the vehicle is the smallest of the three. "Attachment load capacity" is only a calculated value of the force on the attachment itself.
– The installation positioning is reasonable, reliable and safe to prevent the attachment from sliding left and right along the fork frame of the forklift during use.
– After the attachment is hung, the upper hook block should be embedded in the gap of the upper crossbeam to make the center line of the attachment.
– The offset from the center line of the fork frame is less than 50mm, otherwise it will affect the lateral stability of the forklift.
– For accessories with rotating functions (paper roll clamp, soft bag clamp, multi-purpose rigid arm clamp, barrel clamp), stop blocks should be welded on both sides of the connection between the upper beam of the fork frame and the accessories after hanging to prevent the accessories from sliding left and right during operation.
– When installing accessories with lower hook positioning, the clearance between the lower hook and the lower beam of the fork frame should be appropriately adjusted.

8.2 Use of accessories

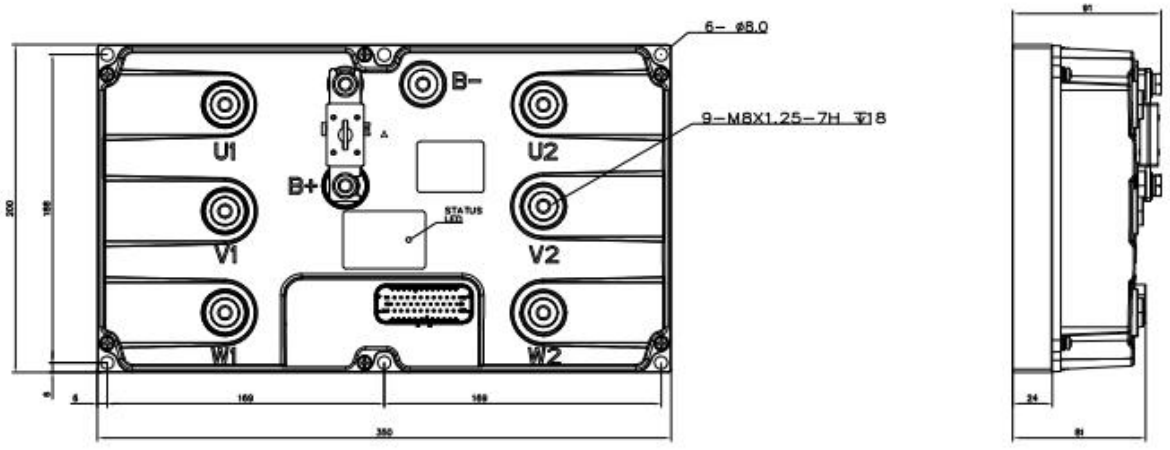
– Be familiar with the relevant content on the nameplate of the forklift attachments, read the relevant instruction manuals carefully before use (especially the user manuals and installation instructions of professional attachment companies), and be trained and qualified to operate forklift attachments.
– Fully understand the basic performance and operation methods of forklift attachments, especially the allowable load, lifting height, cargo size and the applicable range of attachments.
– When operating forklift attachments with multiple functions such as side shifting, clamping or rotation, it is forbidden to perform two actions at the same time, and only one action can be performed after the other is completed.
– It is strictly forbidden to drive a forklift equipped with attachments in a high cargo position; when the cargo volume is too large, it is forbidden to drive the forklift forward; when transporting cargo, the bottom of the cargo should be 300mm off the ground and the mast should be tilted backward.
– The weight of the cargo cannot exceed the limit of the combined carrying capacity of the forklift and attachments. Try not to overload at high cargo positions. For attachments with side shift function, they can only be operated for a short time, and the overload amount is strictly

controlled within the range of 100mm on both sides (the side shift amount of side shifters above 5 tons (including 5 tons) is ±150mm).
- It is strictly forbidden to stand within the 2-meter range directly below the attachment and the projection area directly below the cargo, except for the driver's position protected by the overhead guard, to prevent accidents.
- It is strictly forbidden to emergency brake the forklift with attachments during driving, and it is required to drive slowly when loaded.
- It is forbidden to subject attachments to external force impact during operation; it is forbidden to use attachments in improper occasions and it must not exceed the normal working range of attachments.
- It is forbidden to use attachments in improper occasions and it must not exceed the normal working range of attachments.
- When an attachment fails, it is forbidden to continue to use it without eliminating the problem.

8.3 Inspection and maintenance of attachments

– Check the gap between the lower crossbeam of the forklift fork frame and the lower hook of the attachment to meet the requirements of the attachment manual.
– Check whether the upper hook is correctly embedded in the groove of the forklift fork frame.
– Lubricate the upper and lower sliding bearing surfaces with automotive general lithium-based grease every 500 hours.
– Check whether the fasteners are loose.
– Regularly check whether the joints of the hydraulic circuit of the attachment are loose and whether the hoses are damaged. If damaged, they must not be used before repair.
– Regularly check whether the transmission or rotating elements of the attachment are worn or stuck. If damaged or defective, they need to be replaced in time.
– Under dynamic load, check whether the working elements of the attachment are normal, whether the working pressure of the attachment is normal, and whether the attachment is working normally. If not, it is necessary to check the hydraulic circuit, find out the leaking elements, and replace the seals or the entire circuit elements.

9、Controller




B−
U2
FUSE
U1
B+
V2
V1
W2
W1

9. 1 Terminal Definition

Terminal identification	Type	function
FUSE	INPUT	Positive end of the battery (when connected to a fuse)
B+	INPUT	The positive end of the controller bus
B-	INPUT	Negative end of the battery
U1	OUTPUT	Motor 1 U phase
V1	OUTPUT	Motor 1 V phase
W1	OUTPUT	Motor 1 W phase
U2	OUTPUT	Motor 2 U phase
V2	OUTPUT	Motor 2 V phase
W2	OUTPUT	Motor 2 W phase

9.2 Product Description

The FJ-G2 series products are AC motor controllers that integrate two independent motor controllers and built-in contactors in a compact structure. FJ-G2 provides dual AC motor control, using high-performance microprocessors and dual MCU systems to ensure the highest level of functional safety. It adopts advanced control algorithms to effectively improve the operability and comfort of electric vehicles, and can use the FJ remote monitoring system (optional FJ-M1, M2 instruments) to achieve remote management of electric vehicles, alarm warning, parameter query and modification, operation data analysis and other vehicle networking functions. The FJ-G2 series products use magnetic field oriented control technology to achieve constant torque and constant power control of three-phase AC motors. It has the characteristics of high energy efficiency, strong load adaptive ability, fast torque response, strong short-term overload capacity, etc., which can effectively improve the operability and comfort of electric vehicles. The FJ-G2 series products are suitable for dual motor drive and control in non-road fields, such as industrial vehicles, aerial work platforms, sanitation and cleaning industries.

9.3 Features

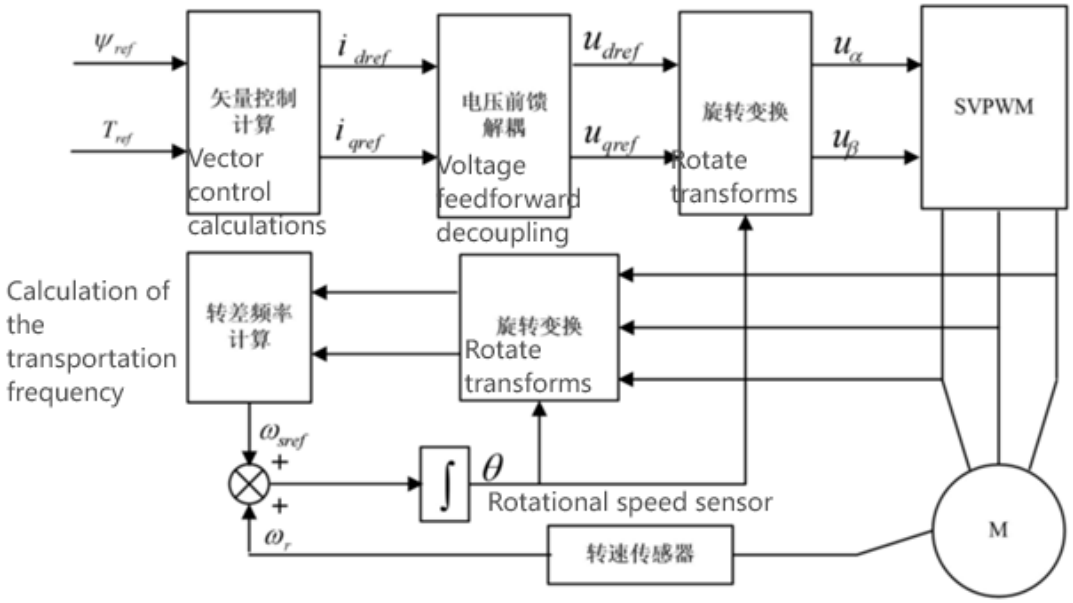
- The main control adopts a 32-bit embedded integrated motor controller with an operating frequency of 120MHz;
- Advanced and efficient control algorithm to achieve constant torque and constant power control of AC induction motors;
- Adopt advanced PWM technology to achieve efficient use of power supply voltage;
- Control motor harmonics are low, can suppress torque ripple, and minimize switching loss;
- Wide range of speed adjustment;
- High and low speeds can be smoothly controlled;
- Adopt a control algorithm that can adapt to motor temperature changes to maintain optimal performance under different conditions;
- Rich external interfaces, dual motor output, multiple digital inputs, analog inputs, high power output, low power output;
- Complete alarm protection function, historical alarm recording function;
- With motor working timing, seat timing, vehicle mileage counting;
- Use CAN communication to realize integrated control system;
- The power circuit adopts an aluminum substrate design scheme, and the power device adopts low-voltage high-power MOSFET The device has a wide voltage range, simple structure, and flexible power matching;
- The power base is an aluminum plate with high thermal conductivity, which provides good heat transfer during heat dissipation and increases reliability;
- Integrated dual motor drive, more compact structure;
- Internal integrated contactor, simple structure, easy assembly.
- Integrated design, streamlined external wiring terminals, faster wiring.

- Supports multiple motor encoder types.

9.4 Technical Specifications

- Operating voltage: Rated 48V/80V
- Maximum operating current: 450A+450A
- Operating ambient temperature: -40℃~50℃
- Storage ambient temperature: -40℃~85℃
- Operating protection temperature: 85℃
- Operating humidity: <85%
- Protection level: IP65

9.5 Control Principle



10、Handheld use

10.1 Function Introduction

The E-GO multi-function debugging tool integrates CAN/RS232 to WIFI/BLE/USB functions. Through this debugging tool, you can use the PC-side tool or the mobile-side applet to access the controller parameters. The mobile-side applet communicates with the multi-function debugging tool via Bluetooth, and the PC-side tool can communicate with the debugging tool via USB or WIFI. E-GO has a built-in rechargeable battery, and users can easily charge it using a standard mobile phone Type-C cable.

The specific features of the multi-function debugging tool are shown in the following table:

Function	describe
Basic functions	● □ The multi-function debugging tool can realize the function of CAN/RS232 to USB/WIFI/BLE transparent transmission; ● □ Support USB communication: It can be connected to the computer via USB and can replace the existing CAN card; ● □ Support WIFI communication: The multi-function debugging tool supports WIFI AP mode. After the computer is connected to the hotspot of the multi-function debugging tool, the host computer can debug the product normally; ● □ Support BLE communication: The multi-function debugging tool supports Bluetooth 5.0. Users can debug the product after connecting to the tool via Bluetooth using the applet; ● □ Built-in rechargeable lithium battery, which can work continuously for more than 8 hours; ● □ With power indication and charging indication functions; ● □ With CAN bus status detection function, the red indicator light is on

	when CANBusHeavy or BusError;

Function	describe
Extended functionality	● Supports mobile applets to access controller parameters; ● *Supports Android and Apple APPs to access controller parameters; ● E-GO supports a variety of ecological tools, such as: CAN message analysis tool FJCAN-View, host computer, firmware burning tool FjBootloaderTool, etc.;

10.2 Technical specifications

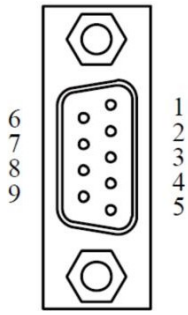
The main technical specifications of the E-GO multi-function debugging tool are shown in the following table:

Specification	Technical Parameters
Operating voltage	5V
Working current	180mA@5V
Charging voltage	5V
Maximum charging current	1A@5V
Battery capacity	2200mAh/3.7V/8.14Wh
Operating temperature	-30℃~70℃
Battery operating temperature	-15℃~70℃
Storage temperature	-30℃~70℃
Operating humidity	<85%
Protection level	IP54

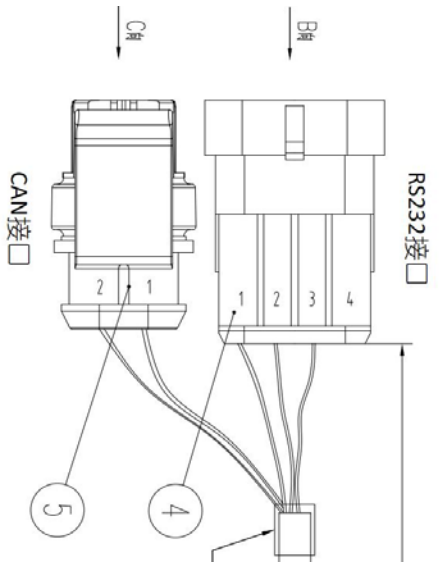
10.3 Control panel description

10.3.1 Interface Definition

The E-GO multi-function debugging tool provides a DB9 male interface, which can be connected to the Fanji motor controller using the DB9 adapter harness provided by Fanji Technology. The pin definitions of the connection terminals are as follows:

DB9 pin socket	Pin number	Pin Name	Functional Description
	1	N.C.	Internally suspended
	2	CAN_L	CAN bus low level
	3	GND	Negative pole of power supply
	4	RS232_TXD	RS232 data transmitter
	5	N.C.	Internally suspended
	6	GND	Negative pole of power supply
	7	CAN_H	CAN bus high level
	8	RS232_RXD	RS232 data receiving terminal
	9	N.C.	Internally suspended

10.4 Supporting harness interface definition



B端口定义：AMP:282106-1

针 脚	功能定义	与DB9母头接线	线色
B-1	RX	A-4	红
B-2	TX	A-8	黄
B-3	GND	A-3和6	绿
B-4	--	--	--

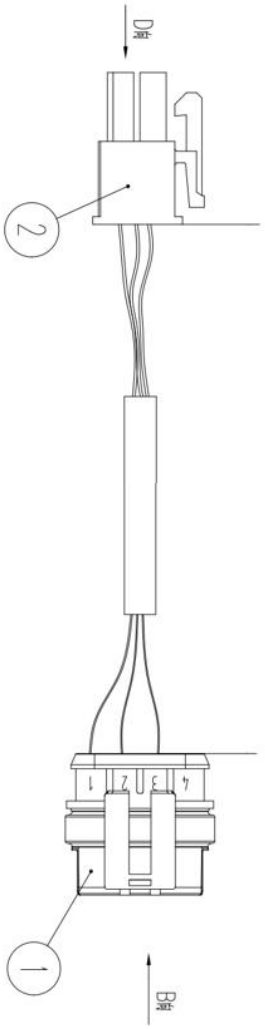
C端口定义：AMP:282080-1

针脚	功能定义	与DB9母头接线	线色
C-1	CAN_L	A-2	棕
C-2	CAN_H	A-7	蓝

B port definition: AMP:282106-1			
pin	Function definition	Wiring with DB9 female	Cable color
B-1	RX	A-4	red
B-2	TX	A-8	yellow
B-3	GND	A-3 & 6	green
B-4	--		

C port definition :AMP:282080-1			
pin	Function definition	Wiring with DB9 female	Cable color
C-1	CAN_L	A-2	Brown
C-2	CAN_H	A-7	blue

10.5 Adapter Harness Interface Definition



D端口定义：Molex 5557-04R（39-01-2040）

针脚	功能定义	与B端口接线	线色
D-1	RX	B-1	白
D-2	GND	B-3	黄
D-3	TX	B-2	蓝
D-4	--	--	--

B端口定义：AMP:282088-1

针 脚	功能定义	线色
B-1	RX	白
B-2	TX	蓝
B-3	GND	黄
B-4	--	--

D port definition: Molex 5557-04R(39-01-2040)			
PIN	Function definition	Wiring with B port	Cable color
D-1	RX	B-1	White
D-2	GND	B-3	yellow
D-3	TX	B-2	

B port definition:AMP:282088-1		
PIN	Function definition	Cable color
B-1	RX	White
B-2	TX	blue
B-3	GND	yellow
B-4	--	

10.6 WeChat Mini Program User Guide

10.6.1 Bluetooth search:

Scan the QR code on the back of the tool, or search for the mini program [Fanji Technology]; jump to the [Fanji Technology] mini program.

- Bluetooth connection:

- Click the red connection icon in the picture above to complete the Bluetooth connection. After the connection, the red icon will become solid.
- Get product information:

After successfully connecting to Bluetooth, as shown in the figure below, basic information such as communication method, main product number, firmware type, etc. will be automatically obtained.

- Common Problem Points:

1. Bluetooth not found: Exit the applet and check the tool status to see if the red light is flashing
2. Main product number and firmware type are empty: Click [Search Product] in the lower right corner to search again

10.6.2 Home page parameters

- Data files:

- As shown in the figure above, after the Bluetooth connection is successful, the product information is automatically obtained. [Next] Automatically go to the cloud server and load the data file with the corresponding main product number and firmware type.

- Home page parameters:

The parameter homepage displays the parameters that need to be monitored in real time according to the permissions: icon parameters, common parameters. This page only monitors parameters, and cannot modify parameters. The parameter icon is configured according to

the data file [Mobile Terminal] (one icon has only one parameter)

10.6.3 Calibration parameters

The calibration parameters include a secondary menu: Select the secondary menu to bring out the parameters of the corresponding permissions under the menu; read-only parameters are light gray, and editable parameters are black. You can switch to the editing mode as shown below by clicking the editable parameter row or the bottom [Edit]. In the editing mode, you can modify the parameter values in batches. After the modification, click the [Confirm] button to complete the parameter sending and modification; [Close] to exit the editing mode and obtain the parameter values normally in real time.


下午4:55
请输入关键词搜索
G2控制器
通用G2设备描述文件
版本: 1.2.7.0
主页
校准
告警
图形
电池组
牵引电机
油泵电机
档位模式
车辆信息
通讯
系统参数
SOC(%) 0
IB电流(A) 0
KSI电压值(V) 38.3
母线/电池欠压切断… 1~200 47
欠压预警点（SOC… 1~100 20
欠压告警点（SOC… 1~100 14
蓄电池组
启动时，BDI重新评… 0~1 OFF
编辑

10.6.4 Debugging parameters

The debugging parameters include a secondary menu: Select the secondary menu to bring out the parameters of the corresponding permissions under the menu; read-only parameters are light gray, and editable parameters are black. You can switch to the editing mode as shown below by clicking the editable parameter row or the bottom [Edit]. In the editing mode, you can modify the parameter values in batches. After the modification, click the [OK] button to complete the parameter sending and modification; [Close] to exit the editing mode and obtain the parameter values normally in real time.

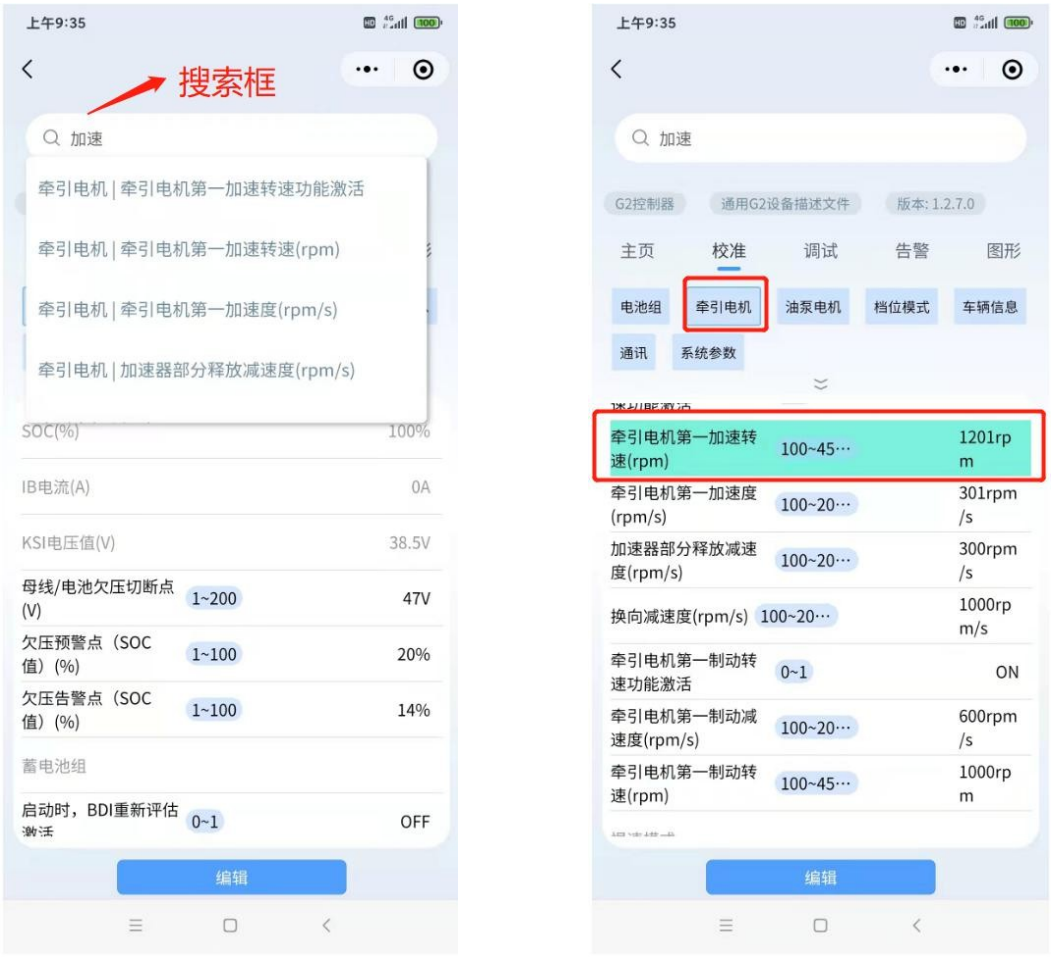
10.6.5 Alarm parameters

Alarms are divided into: current alarms and historical alarms. Select a row as shown below to display the detailed alarm name, alarm cause, and solution.


上午9:30
请输入关键词搜索
G2控制器
通用G2设备描述文件
版本: 1.2.7.0
主页
校准
调试
告警
图形
告警详细信息
当前告警
历史告警
序号 代码 等级 数据 名称
1 101 11 0 CAN总线通信故障
2 98 1 12 电容器预充电过慢
3 2 2 382 蓄电池欠压保护
4 93 2 3112 起升电位器故障
5 90 20 3115 启动时，起升电位器激活
6 96 2 999 油泵电机温度传感器开路故障
7


上午9:30
请输入关键词搜索
G2控制器
通用G2设备描述文件
版本: 1.2.7.0
主页
校准
调试
告警
图形
4 93 2 3112 起升电位器故障
5 90 20 3115 启动时，起升电位器激活
6 96 2 999 油泵电机温度传感器开路故障
7
8
9
告警名称
CAN总线通信故障
告警原因
控制在约定时间内，未接受到总线上其它设备数据
解决方案
1.检查线束2.联系主机厂3.更换逻辑板

10. 6. 6 Parameter keyword search



As shown in the figure above, enter keywords in the search box and the search results will pop up. Select the parameter you want to view, and it will automatically jump to the corresponding parameter, marking the entire row background of the result parameter.

10.6.7 Account Login

● Login: Enter your account, password, and verification code as shown above to complete the login. Click [Login] to jump to the Bluetooth search page.
● My: Change the password, log out, and switch users through the interface.
● Change password: Enter the old password and new password. Click [Submit] to complete the password change.

10.6.8 Question Feedback

Upload the fault picture as shown above, fill in the subject, content, person reporting the problem, and contact information; click [Upload] to complete the problem feedback.

10.6.9 Firmware Upgrade

As shown above, click the upgrade button on the right side of [Tool Version] to upgrade the E-GO firmware online.

10. 6. 10 Project Files

As shown in the picture above, click the download button on the right side of [Project File] to download and upload the product engineering file to the Fanji Technology backend management system. Fanji service engineers can download the project file by logging in with their account.

10.6.11 Message diagnosis

As shown in the figure above, click on the right side of [Communication Type], the [Diagnosis] interface pops up, select [Baud Rate], fill in the message filter [From], [To], and click [Start]; you can observe the bus CAN status and messages.

10.6 PC Instructions for use of the host computer

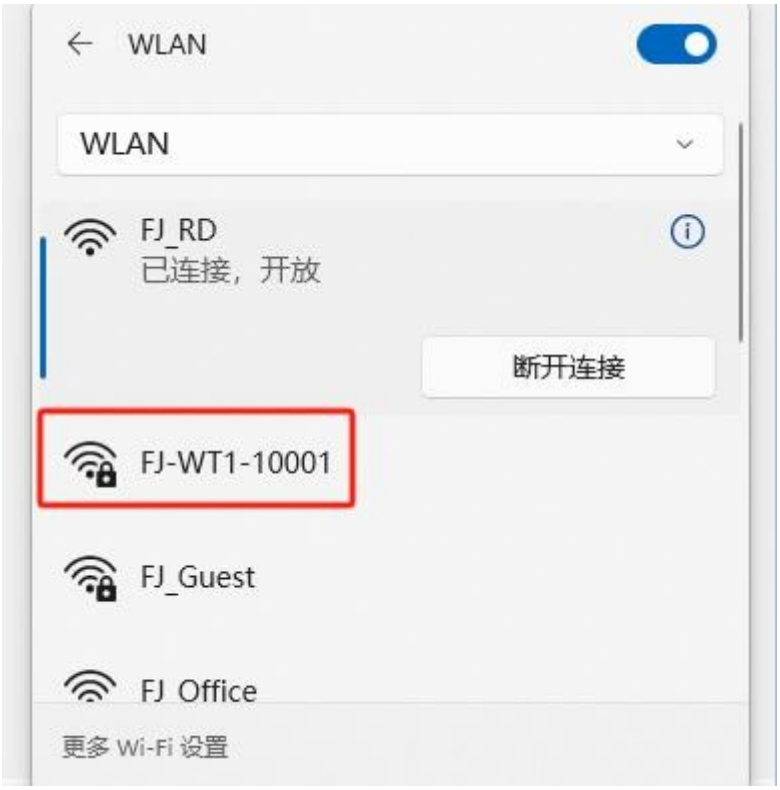
The multifunctional debugging tool E-GO supports two connection modes when connected to the host computer: USB and WIFI.

10.6.1 USB connection

Switch E-GO to USB mode, connect to PC, turn on the host computer, and click [Data File] to complete the data file selection; in the box below, select [FJ232-USB…], [FJCAN-USB…] according to the serial port and CAN.

For specific operations, please refer to the [Electronic Control Editing Tool User Manual].

10.6.2 WIFI CONNECTIVITY



E-GO Switch to USB mode, connect to PC, select hotspot Network: FJ-WT1-xxxx, Password: wt123456

Click [Data File] to complete the data file selection; In the following frame, complete the selection according to the serial port and CAN 【FJ232-WIFI】, 【FJCAN-WIFI】. For specific operations, please refer to the 【Electronic

Control Editing Tool User Manual】.

10.7 Failure and recovery

The possible faults and corresponding recovery methods of the multi-functional debugging tool E-GO during use are as follows:

Fault	Recovery Methods
Bluetooth not found	Check if the red light on the tool is flashing continuously; Power off the tool and restart the applet;
Failed to obtain data file	Check the main product number and firmware type; Contact the developer to upload the data file;
Data is not displayed in real time	Enter the parameter interface and check whether the tool TX/RX keeps flashing;

11、Fault Summary Table

Fault name	Fault Codes	Remark
Battery pack overvoltage protection	1	
Battery pack undervoltage protection	2	
The accelerator pedal was depressed before starting	3	
Maintenance due warning	4	
Flash memory failure	5	
Drive bus low voltage alarm	6	
Overvoltage current limiting activation warning	7	
Overcurrent fault of traction motor power unit	8	
Module manufacturer parameters are inconsistent	9	
Oil pump motor power unit overheat alarm	10	
The pre-charged capacitors fail to discharge effectively when the system starts	11	
Battery low voltage alarm	12	
Traction motor high temperature alarm	13	
Oil pump motor high temperature alarm	14	
Traction motor current loss	15	
Traction motor fan valve control coil open circuit	16	
Main circuit breaker coil overcurrent alarm	17	
Main circuit breaker control coil open	18	
Main circuit breaker coil sticking	19	
Overheating of the traction motor power unit	20	
Dual MCU system communication timeout	21	
Electromagnetic brake coil wire breakage	22	

Electromagnetic brake coil wire breakage	23	
The oil pump motor power unit is not saturated or overcurrent	24	
Reversing buzzer control port load disconnection	25	

Oil pump power unit software overcurrent	26	
Controller output overload	27	
Traction power unit software overcurrent	28	
DRIVE2 channel current is too large	29	
DRIVE3 channel current is too large	30	
Traction power unit output phase loss	31	
The output phase of the oil pump power unit is missing	32	
Battery pack low voltage, output current limiting	33	
Oil pump motor temperature control fan control valve load open circuit	34	
Reversing buzzer control port output overcurrent	35	
Oil pump motor current loss	36	
Control unit 5V voltage output failure	37	
Control unit 12V voltage output failure	38	
Traction motor stall (jam) fault	39	
HP_OUT1 output port overcurrent	40	
HP_OUT2 output port overcurrent	41	
HP_OUT3 output port overcurrent	42	
HP_OUT4 output port overcurrent	43	
HP_OUT5 output port overcurrent	44	
DO6 output port overcurrent	45	
DO7 output port overcurrent	46	
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Battery pack overvoltage protection

- Fault code: 1
- Fault level: 1
- Fault cause: Through internal measurement of the control unit, it was found that the instantaneous battery pack voltage exceeded the maximum allowable threshold.
- Solution:

  1. Check whether the battery pack and the electronic control system connection cable are well connected.

  2. Check whether the battery pack voltage level is normal.

  3. Replace the control unit.

Battery pack undervoltage protection

- Fault code: 2
- Fault level: 1
- Fault cause: Through internal measurement of the control unit, it is found that the instantaneous battery pack voltage is lower than the minimum allowable threshold.
- Solution:

  1. Check whether the battery wiring is incorrect and whether the positive and negative electrode terminals are severely corroded.

  2. Check the battery status: If the battery electrolyte is partially exhausted, the controller undervoltage protection fault may be triggered; or when the battery power level is already very low and a high current is required to work (such as the motor working at full load), the undervoltage protection fault may also be triggered.

  3. Replace the control unit.

The accelerator pedal was depressed before starting

- Fault code: 3
- Fault level: 1
- Fault cause: During the system power-on self-test (the main circuit breaker is not closed), the driver pressed the accelerator pedal in advance.
- Solution:

  1. If the fault code is caused by the driver pressing the accelerator pedal in advance during the system power-on self-test (the main circuit breaker is not closed), please release the accelerator pedal and restart.

  2. Check the numerical setting of the accelerator pedal calibration to see if the minimum and maximum voltage values of the accelerator pedal are set correctly. If not, recalibrate. You can use the host computer monitoring software or instrument to set it.

  3. Check whether the control unit and the accelerator pedal in the main wiring harness are correctly connected. If there is no problem with the wiring, press the accelerator pedal through the host computer monitoring software to observe whether the pedal feedback voltage value is within the correct range.

  4. Replace the control unit.

Maintenance due

- Fault code: 4
- Fault level: 20
- Fault cause: Maintenance cycle has arrived.
- Solution:

  1. Perform maintenance on the

vehicle and reset the maintenance timer in the controller through the FJ monitoring software or instrument.

2. Turn off this function.

Flash memory failure

- Fault code: 5
- Fault level: 1
- Fault cause: One or more vehicle performance or motor control parameter values in the control unit exceed the allowable range or an error is found during write verification (write and read are inconsistent).
- Solution:

  1. Flash memory reloads default values: Use FJ controller programming tool to perform "restore factory settings" operation

  2. If this alarm is still not cleared after powering on again in solution 1, replace the control unit.

Drive bus low voltage alarm

- Fault code: 6
- Fault level: 1
- Fault cause: When the motor is working, it is found that the voltage level of the driver busbar is lower than 10% of the battery voltage level at the same time.
- Solution:

  1. After powering on, wait for the main circuit breaker to close before starting work.

  2. Check whether the main circuit breaker coil control connection terminal and the main wiring harness connection terminal are correctly connected.

  3. Check whether the main fuse is intact.

  4. Replace the main circuit breaker.

  5. Replace the control unit.

6. Overvoltage current limiting activation warning

- Fault code: 7
- Fault level: 20
- Fault cause: The controller voltage exceeds the set value, limiting the braking current.
- Solution:

  1. Check if the battery connection is good.

  2. Check if the battery pack related parameters match. Overcurrent fault of traction motor power unit

- Fault code: 8
- Fault level: 1
- Fault cause: The actual current of the drive power module exceeds the limit value.
- Solution:

  1. Check whether the UVW three-phase cable connection between the drive module and the motor is short-circuited (there is a short circuit between the three-phase cables or between a phase cable and the frame), and check whether the motor coil has a burning smell.

  2. Check whether the connection cable between the control unit and the power module is connected normally (only for V series products).

  3. Disconnect the UVW cable connection of the drive module, and use the high-end resistance range of the multimeter to detect whether the resistance value between the +/-B terminal and the UVW terminal of the module is symmetrical. If it is found that the resistance value of one phase deviates greatly from the other phases, it can be determined that the power module has been burned and needs to be replaced.

  4. Replace the control unit.

Module manufacturer parameters are inconsistent

- Fault code: 9
- Fault level: 2
- Fault cause: The manufacturer parameters of the oil pump and the drive are inconsistent.
- Solution:
- 1. Replace the controller with the same parameters as the manufacturer;
- 2. Use the host computer to change the manufacturer's parameters;
- The pre-charged capacitor failed to discharge effectively when the system started
- Fault code: 11
- Fault level: 1
- Fault cause: During the system power-on self-test, the charge stored in the pre-charge capacitor was not effectively discharged.
- Solution:

  1. Check whether the UVW connection cable between the oil pump motor and the oil pump power module is well connected.

  2. Check whether the cable between the oil pump power module and the control unit is properly connected (only for V series products).

  3. Replace the oil pump motor power module (only for V series products).

  4. Replace the main circuit breaker.

  5. Replace the control unit.

Battery low voltage alarm

- Fault code: 12
- Fault level: 3
- Fault cause: The battery voltage is lower than the discharge protection value.
- Solution:

  1. Charge the battery. Please note that if the battery voltage level is still lower than the "battery pack reset value" after charging, the fault code will not be eliminated. It is necessary to ensure that the battery voltage level is higher than the "battery pack reset value" after charging, so that the fault code will be eliminated and the electronic control can work normally.

  2. Measure the battery voltage. If the measured value does not match the "battery pack discharge protection value", replace the control unit.

Traction motor high temperature alarm

- Fault code: 13
- Fault level: 20
- Fault cause: The measured temperature value of the drive motor exceeds the temperature value of the "drive motor over-temperature protection point" set by the user.
- Solution:

  1. First check whether the connection between the motor temperature sensor and the main wiring harness is normal.

  2. If the fault occurs when the motor is not hot:

  3. Use a handheld multimeter, set to resistance measurement mode, measure the resistance value between the two wires of the motor temperature sensor, and compare it with the motor temperature sensor truth table. If the measured value does not match the actual motor temperature, then replace the temperature sensor.

  4. Replace the control unit.

  If this fault occurs when the motor is very hot:

  1. If the temperature value read from the host computer monitoring software

or instrument is consistent with the actual temperature of the motor, check whether the motor housing is clean and whether the motor heat dissipation is normal.

2. Check whether the drive motor is working normally, whether there is brake locking or other abnormal conditions.

Oil pump motor high temperature alarm

- Fault code: 14
- Fault level: 6
- Fault cause: The measured temperature value of the oil pump motor is about to reach the maximum temperature value allowed by the "oil pump motor over-temperature protection point" set by the user.
- Solution:

  First check whether the connection between the motor temperature sensor and the main wiring harness is normal. If this fault occurs when the motor is not hot:

  1. Use a handheld multimeter, set to resistance measurement mode, measure the resistance value between the two wires of the motor temperature sensor, and compare it with the motor temperature sensor truth table. If the measured value does not match the actual motor temperature, then replace the temperature sensor.

  2. Replace the control unit.

  If this fault occurs when the motor is very hot:

  1. If the temperature value read from the upper computer monitoring software or instrument is consistent with the actual temperature of the motor, check whether the motor housing is clean and whether the motor heat dissipation is normal.

  2. Check whether the motor is working properly, especially whether the oil pump motor has been working for a long time due to the multi-way valve lever potentiometer or switch signal not being reset normally. The oil pump motor will work very high if it works for a long time.

Traction motor current loss

- Fault code: 15
- Fault level: 1
- Fault cause: The phase current of the drive motor is not zero when the system is turned on.
- Solution:

  1. Check whether the connection cable between the motor power module and the control unit is correctly connected (only for V series products).

  2. Replace the power module (only for V series products). Replace the control unit.

Traction motor fan valve control coil open circuit

- Fault code: 16
- Fault level: 12
- Fault cause: Controller internal detection, traction motor fan control port output current is too small.
- Solution:

  1. Check whether the main circuit

breaker coil has an external short circuit.

2. Check the connection harness.

3. Replace the control unit.

Main circuit breaker coil overcurrent alarm

- Fault code: 17
- Fault level: 1
- Fault cause: The main circuit breaker coil current is too large.
- Solution:

1. Check whether the main circuit breaker coil has an external short circuit.

2. Replace the main circuit breaker.

3. Replace the control unit.

Main circuit breaker control coil open

- Fault code: 18
- Fault level: 1
- Fault cause: The main circuit breaker coil cannot be energized.
- Solution:

1. Check if the main circuit breaker control port is broken.

2. Check the control harness;

3. Replace the main circuit breaker;

4. Replace the main circuit breaker;

Main circuit breaker coil sticking

- Fault code: 19
- Fault level: 1
- Fault cause: The main circuit breaker coil was stuck before power was turned on.
- Solution:

Replace the main circuit breaker;

Overheating of the traction motor power unit

- Fault code: 20
- Fault level: 5
- Fault cause: The temperature of the drive motor power module exceeds the protection temperature of the drive motor power module
- Solution:

1. This fault may be caused by insufficient heat dissipation. Check the heat dissipation between the power module and the aluminum plate, and between the aluminum plate and the frame. A uniform and appropriate amount of thermal grease between the module and the aluminum plate, and between the aluminum plate and the frame is a necessary guarantee for effective heat dissipation. Note: The temperature of the motor power module can be read through the host computer software or instrument.

2. If the heat dissipation measures of the above modules are all good, then it is necessary to check whether the drive motor is working properly. An abnormal motor will cause the power module to overheat; secondly, consider replacing the power module.

3. Replace the control unit.

System communication timeout between microprocessors (CE, dual MCU)

- Fault code: 21
- Fault level: 1
- Fault reason: No data was received from the slave MCU within the agreed time
- Solution:

1. Replace the controller

Electromagnetic brake control coil open circuit

- Fault code: 22

- Fault level: 2
- Fault cause: Internal detection of the controller, the output current of the control port is too small

Solution:

1. Check the electromagnetic brake control coil
2. Check the connection harness
3. Replace the controller

DRIVE1 channel current is too large

- Fault code: 23
- Fault level: 12
- Fault cause: DRIVE1 channel overcurrent

Solution:

1. Check the external connection corresponding to the DRIVE1 channel to see if a large load is connected
2. Check the external connection corresponding to the DRIVE1 channel to see if a high voltage is input
3. Replace the control unit.

The oil pump motor power unit is not saturated or overcurrent

- Fault code: 24
- Fault level: 1
- Fault cause: The actual current of the oil pump motor power module exceeds the limit value.

Solution:

1. Check whether the UVW three-phase cable connection between the oil pump module and the motor is short-circuited (there is a short circuit between the three-phase cables or between a phase cable and the frame), and check whether the motor coil has a burning smell.
2. Check whether the connection cable between the control unit and the oil pump module is connected normally (only for V series products).
3. Disconnect the UVW cable connection of the oil pump module, and use the high-end resistance range of the multimeter to detect whether the resistance value between the +/-B terminal and the UVW terminal of the module is symmetrical. If it is found that the resistance value of one phase deviates greatly from the other phases, it can be determined that the power module has been burned and needs to be replaced.
4. Replace the control unit.

Reversing buzzer control port load disconnection

- Fault code: 25
- Fault level: 2
- Fault cause: Internal detection of the controller, the output current of the control port is too small

Solution:

1. Check the electromagnetic brake
2. Check the connection harness
3. Replace the controller

Oil pump power unit software overcurrent

- Fault code: 26
- Fault level: 1
- Fault cause: Internal detection of the controller, the output current of the oil pump power unit is too large

Solution:

Controller output overload

- Fault code: 27
- Fault level: 1
- Cause of failure: The controller

output current exceeds the system setting value.

Solution:

1. Make sure the threshold setting is reasonable.

2. Check whether there is a short circuit in the UVW three-phase cable connection between the drive module and the motor (there is a short circuit between the three-phase cables or between a certain phase cable and the forklift frame), and check whether there is a burning smell in the motor coil.

3. Disconnect the UVW cable of the power module, and use the high-end resistance setting of a multimeter to check whether the resistance value between the +/-B terminal and the UVW terminal of the module is symmetrical. If it is found that the resistance value of one phase deviates greatly from the other phases, It can be determined that the power module has been burned and the controller needs to be replaced.

Traction motor software overcurrent

- Fault code: 28
- Fault level: 1
- Cause of the fault: The controller internally detected that the output current of the oil pump power unit was too large.

Solution:

1. Check the traction load condition

2. Check UVW three-phase connecting cable

3. Make sure the overcurrent threshold is set appropriately

4. Replace the drive unit

DRIVE2 channel current is too large

- Fault code: 29
- Fault level: 12
- Cause of failure: DRIVE2 channel overcurrent

Solution:

1. Check the external connection corresponding to the DRIVE2 channel to see if a larger load is connected

2. Check the external connection corresponding to the DRIVE2 channel to see if a higher voltage is input

3. Replace the control unit.

DRIVE3 channel current is too large

- Fault code: 30
- Fault level: 12
- Cause of failure: DRIVE3 channel overcurrent

Solution:

1. Check the external connection corresponding to the DRIVE3 channel to see if a larger load is connected

2. Check the external connection corresponding to the DRIVE3 channel to see if a higher voltage is input

3. Replace the control unit.

Traction power unit output phase loss

- Fault code: 31
- Fault level: 1
- Cause of the fault: When the enable detection function is valid, the output phase of the power-on self-test module of the drive module is missing.

Solution:

1. Check whether the U, V, and W power cords of the motor are reliably connected.

2. Replace the drive module.

Oil pump power unit output phase loss

- Fault code: 32
- Failure level: 1

- Cause of failure: When the enable detection function is valid, the output phase of the oil pump module power-on self-test module is missing.

Solution:

1. Check whether the U, V, and W power cords of the motor are reliably connected.

2. Replace the oil pump module.

Battery pack low voltage, output current limit

- Fault code: 33
- Failure level: 7
- Cause of failure: The controller internally detected that the battery pack voltage was too low and began to limit the maximum current output.

Solution:

1. Check battery pack connection

2. Determine the remaining capacity and whether it is under-voltage

3. Make sure the current limiting threshold is reasonable

Oil pump motor temperature control fan control valve load open circuit

- Fault code: 34
- Failure level: 12
- Cause of failure: Internal detection of the controller, the current at the oil pump motor temperature control fan control port is too small

Solution:

1. Check the load condition

2. Check the connection harness

3. Replace the controller

Reversing buzzer control port output overcurrent

- Fault code: 35
- Failure level: 12
- Cause of the fault: Internal detection of the controller, the output current of the reversing buzzer control port is too large

Solution:

1. Check the load condition

2. Check the connection harness

3. Replace the controller

Oil pump motor current loss

- Fault code: 36
- Failure level: 1
- Cause of failure: The phase current of the oil pump motor is not zero when the system is turned on.

Solution:

1 Check whether the connection cable between the oil pump power module and the control unit is correctly connected (V series products only).

2. Replace the oil pump power module (V series products only).

3. Replace the control unit.

Control unit 5V voltage output failure

- Fault code: 37
- Failure level: 1
- Cause of failure: Control unit 5V output voltage is too low

Solution:

1. Check whether the 5V output is grounded and whether the wiring of each motor encoder is correct.

2. Eliminate external devices that use the 5V output of the control unit one by one.

3. Replace the control unit.

Control unit 12V voltage output failure

- Fault code: 38
- Failure level: 1
- Cause of failure: The 12V output voltage of the control unit is too low

Solution:

1. Check whether the 12V output is grounded. This may usually be caused by incorrect wiring of the following devices:
   - accelerator pedal
   - lift sensor
   - steering sensor
   - meter
2. Eliminate external devices that use the 12V output of the control unit one by one.
3. Replace the control unit.

Traction motor stall (locked rotor) fault

- Fault code: 39
- Failure level: 2
- Cause of failure: The controller has a traction speed command, but the actual motor speed is always 0rpm.

Solution:

1. Check the traction motor encoder
2. Check the connection harness
3. Check the traction load status
4. Make sure the maximum output current threshold is set appropriately

HP_OUT1 output port overcurrent

- Fault code: 40
- Failure level: 15
- Cause of failure: The port output current exceeds 2.2A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.
2. Check whether there is a short circuit in the corresponding output port connection harness.
3. Replace the controller.

HP_OUT2 output port overcurrent

- Fault code: 41
- Failure level: 15
- Cause of failure: The port output current exceeds 3.0A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.
2. Check whether there is a short circuit in the corresponding output port connection harness.
3. Replace the controller.

HP_OUT3 output port overcurrent

- Fault code: 42
- Failure level: 15
- Cause of failure: The port output current exceeds 2.2A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.
2. Check whether there is a short circuit in the corresponding output port connection harness.
3. Replace the controller.

HP_OUT4 output port overcurrent

- Fault code: 43
- Failure level: 15
- Cause of failure: The port output current exceeds 2.2A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.
2. Check whether there is a short circuit in the corresponding output port connection harness.
3. Replace the controller.

HP_OUT5 output port overcurrent

- Fault code: 44
- Failure level: 15
- Cause of failure: The port output

current exceeds 2.2A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.

2. Check whether there is a short circuit in the corresponding output port connection harness.

3. Replace the controller.

DO6 output port overcurrent

- Fault code: 45
- Failure level: 15
- Cause of failure: The port output current exceeds 1.1A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.

2. Check whether there is a short circuit in the corresponding output port connection harness.

3. Replace the controller.

DO7 output port overcurrent

- Fault code: 46
- Failure level: 15
- Cause of failure: The port output current exceeds 1.1A.

Solution:

1. Check whether the load connected to the corresponding output port is too large.

2. Check whether there is a short circuit in the corresponding output port connection harness.

3. Replace the controller.

Seat belt warning buzzer port output overcurrent

- Fault code: 47
- Failure level: 12
- Cause of failure: Internal detection of the controller, the output current of the seat belt buzzer control port is too large

Solution:

1. Check the load condition
2. Check the connection harness
3. Replace the controller

Seat belt warning buzzer port load open circuit

- Fault code: 48
- Failure level: 12
- Cause of failure: Internal detection of the controller, the output current of the seat belt buzzer control port is too small

Solution:

1. Check the load condition
2. Check the connection harness
3. Replace the controller

ISO valve control coil open circuit

- Fault code: 49
- Failure level: 12
- Cause of failure: Internal detection of the controller, the output current of the ISO valve control port is too small

Solution:

1. Check the load condition
2. Check the connection harness
3. Replace the controller

The oil pump motor command lever is activated when the system is started

- Fault code: 50
- Failure level: 7
- Cause of failure: When the system is started, the lifting potentiometer or tilt lever or other auxiliary function switch signal has been activated.

Solution:

1.Reset all activated commands

(including lifting potentiometer and each switch signal).

2. Check whether the voltage of the lifting potentiometer exceeds the set value, and you can use the Fanji controller programming tool software to recalibrate it.

3. Replace the control unit.

Oil pump control unit 12V voltage output failure

- Fault code: 51
- Failure level: 1
- Cause of failure: The 12V output voltage of the control unit is too low

Solution:

1. Check whether the 12V output is grounded. This may usually be caused by incorrect wiring of the following devices:
   - accelerator pedal
   - lift sensor
   - steering sensor
   - meter

2. Eliminate external devices that use the 12V output of the control unit one by one.

3. Replace the control unit.

Oil pump control unit 5V voltage output failure

- Fault code: 52
- Failure level: 1
- Cause of failure: The 5V output voltage of the oil pump control unit is too low

Solution:

1. Check whether the 5V output is grounded and whether the wiring of each motor encoder is correct.

2. Eliminate external devices that use the 5V output of the control unit one by one.

3. Replace the control unit.

Oil pump flash memory fault alarm

- Fault code: 53
- Failure level: 1
- Cause of the fault: One or more vehicle performance or motor control parameter values within the control unit exceed the allowable range or errors are found during write verification (writing and reading are inconsistent).

Solution:

1 Flash memory reloads default values: Use the FJ controller programming tool to perform "restore factory settings" operation

2. If the alarm is still not cleared after powering on again in Solution 1, replace the control unit.

Oil pump DRIVE1 channel current is too large

- Fault code: 54
- Failure level: 12
- Cause of failure: Oil pump DRIVE1 channel overflow

Solution:

1. Check the external connection corresponding to the DRIVE1 channel of the oil pump to see if a larger load is connected

2. Check the external connection corresponding to the DRIVE1 channel of the oil pump to see if a higher voltage is input.

3. Replace the control unit.

Oil pump DRIVE2 channel current is too large

- Fault code:55
- Failure level: 12
- Cause of failure: Oil pump DRIVE2

channel overflow

Solution:

1. Check the external connection corresponding to the DRIVE2 channel of the oil pump to see if a larger load is connected

2. Check the external connection corresponding to the DRIVE2 channel of the oil pump to see if a higher voltage is input

3 Replace the control unit.

Oil pump DRIVE3 channel current is too large

- Fault code: 56
- Failure level: 12
- Cause of failure: DRIVE3 channel overcurrent

Solution:

1. Check the external connection corresponding to the DRIVE3 channel of the oil pump to see if a larger load is connected

2. Check the external connection corresponding to the DRIVE3 channel of the oil pump to see if a higher voltage is input

3 Replace the control unit.

Oil pump default parameters are wrong

- Fault code: 57
- Failure level: 1
- Cause of failure: The oil pump software version is wrong.

Solution:

1. Use Fanji controller programming tool to restore factory setting parameters.

2. If the fault code still exists, replace the control unit.

Wrong module type (D1 series controller)

- Fault code:58
- Failure level: 1
- Cause of the fault: The wiring harness currently used by the module is inconsistent with the set module type.

Solution:

1. Check the wiring harness.

2. Check the module type parameters.

Overspeed warning (non-D1 series controller)

- Fault code: 58
- Fault level: 1
- Cause of failure: The current feedback speed exceeds the set alarm threshold.
- Solution:

1 Reduce the driving speed and drive safely.

2. Set the alarm threshold to an appropriate value.

"Emergency Reverse" is not released

- Fault code: 59
- Fault level: 1
- Cause of the fault: The "Emergency Reverse" action time reaches the set threshold, but the "Emergency Reverse" switch is still activated.
- Solution:

1. Check whether the "emergency reverse" switch is normal and restart the system.

"Emergency reverse" start condition error

- Fault code: 60
- Fault level: 20
- Cause of the fault: When the motor received the running command, the

"emergency reverse" switch was activated.

 Solution:

1. Release the "Emergency Reverse" switch.

2. Check whether the "emergency reverse" switch is normal.

Traction motor overheats and shuts down

 Fault code: 61

 Fault level: 1

 Cause of failure: The measured temperature value of the drive motor exceeds the maximum temperature allowed by the user setting. (Drive motor over-temperature cut-off point)

 Solution: Same as fault code 13.

Direction switch failure

 Fault code: 62

 Fault level: 2

 Cause of the fault: The forward and reverse directions of the direction switch are activated at the same time.

 Solution:

1. Check the direction switch.

2. Check the relevant wiring harness.

3. Replace the controller.

Seat switch is not closed when starting

 Fault code: 63

 Fault level: warning

 Cause of the fault: When the system is powered on, the seat switch is not closed; or after the main circuit breaker is closed, the seat switch is turned off for longer than the time set by the parameter "seat switch delay".

 Solution:

1. Check whether the seat switch is disconnected or damaged.

2. Replace the control unit.

Direction switch activated at start-up

 Fault code: 64

 Fault level: warning

 Cause of the fault: When starting up the machine, the forward/backward switch has been activated.

 Solution:

1. Check whether the forward/reverse switch is activated when the vehicle is started.

2. If the direction switch is not activated, check whether the direction switch connection terminal and the main wiring harness connection terminal are correctly connected. Assisted detection can be carried out through Fanji's host computer monitoring software.

3. Replace the direction switch.

4. Replace the control unit.

Oil pump motor overheats and shuts down

 Fault code: 65

 Fault level: 1

 Cause of failure: The measured temperature value of the oil pump motor exceeds the maximum temperature allowed by the user. (Oil pump motor over-temperature cut-off point)

 Solution: Same as fault code 14.

Traction motor power module overheats and shuts down

 Fault code: 66

 Fault level: 1

 Cause of failure: The temperature of the drive motor power module exceeds the over-temperature cut-off value of the drive motor power module.

 Solution: Same as fault code 20.

When driving, parking is not released.

 Fault code: 67

 Fault level: 2

 Cause of the fault: An alarm occurs when the accelerator pedal is pressed when the handbrake is in effect.

 Solution:

Release the handbrake or release the accelerator pedal;

Oil pump motor power unit overheats and shuts down

 Fault code: 68

 Fault level: 1

 Cause of failure: The temperature of the oil pump motor power module exceeds the over-temperature cut-off value of the oil pump motor power module.

 Solution: Same as fault code 10.

Remote lock car

 Fault code: 69

 Fault level: 2

 Cause of failure: There is no communication after remote locking or car networking for 30 consecutive power-on times.

 Solution:

Check whether remote car locking or car network CAN communication is normal

Electromagnetic brake port output overcurrent

 Fault code: 70

 Fault level: 12

 Cause of failure: Internal detection of the controller, the output current of the electromagnetic brake control port is too large

 Solution:

1. Check the load condition
2. Check the connection harness
3. Replace the controller

Traction motor power unit temperature sensor failure

 Fault code: 71

 Fault level: 5

 Cause of failure: The feedback value of the temperature sensor of the drive motor power module exceeds the measurement range.

 Solution:

1. Check whether the cable connection between the drive motor power module and the control unit is normal (V series products only).
2. Replace the drive motor power module (V series products only).
3. Replace the control unit.

Oil pump motor power unit temperature sensor failure

 Fault code: 72

 Fault level: 6

 Cause of failure: The feedback value of the temperature sensor of the oil pump motor power module exceeds the measurement range.

 Solution:

1. Check whether the cable connection between the oil pump motor power module and the control unit is normal (V series products only).
2. Replace the oil pump motor power module (V series products only).
3. Replace the control unit.

Oil pump motor encoder failure

 Fault code: 73

 Fault level: 2

 Cause of failure: The encoder (A or B) channel signal is suddenly lost while the oil pump motor is working.

 Solution:

1. Check whether the encoder is correctly connected to the motor and control unit:

2. If the wiring is correct and the connection is good, replace the encoder.

3. Replace the control unit.

Traction motor encoder failure

 Fault code: 74

 Fault level: 2

 Cause of the fault: The encoder (A or B) channel signal is suddenly lost while the drive motor is working.

 Solution:

1. Check whether the encoder is correctly connected to the motor and control unit

2. If the wiring is correct and the connection is good, replace the encoder.

3. Replace the control unit.

ISO solenoid valve control port output overcurrent

 Fault code: 75

 Fault level: 12

 Cause of failure: Internal detection of the controller, the output current of the ISO solenoid valve control port is too large

 Solution:

1. Check the load condition

2. Check the connection harness

3. Replace the controller

Traction fan control port output overcurrent

 Fault code: 76

 Fault level: 12

 Cause of failure: Internal detection of the controller, the output current of the traction fan control port is too large

 Solution:

1. Check the load condition

2. Check the connection harness

3. Replace the controller

Traction motor temperature sensor failure

 Fault code: 77

 Fault level: 20

 Cause of failure: The temperature of the drive motor is higher than that of the oil pump motor, and the temperature difference between the two motors exceeds 70°C.

 Solution:

1. Check whether the connection between the drive motor temperature sensor and the main wiring harness is normal.

2. Replace the drive motor temperature sensor.

3. Replace the control unit.

Built-in contactor overcurrent

 Fault code: 78

 Fault level: 1

 Cause of failure: Controller internal detection, built-in contactor current is too large

 Solution:

1. Check the load condition

2. Replace the controller

Oil pump motor temperature sensor failure

 Fault code: 79

 Fault level: 20

 Cause of failure: The temperature of the oil pump motor is higher than that of the drive motor, and the temperature difference between the two motors exceeds 70°C.

 Solution:

1. Check whether the connection

between the oil pump motor temperature sensor and the main wiring harness is normal.

2. Replace the oil pump motor temperature detector.

3. Replace the control unit.

Traction motor power unit temperature sensor failure

 Fault code: 80

 Fault level: 20

 Cause of the fault: The temperature of the drive motor power module is higher than the oil pump motor power module, and the temperature difference between the two motor power units exceeds 70°C.

 Solution:

1. Check whether the connection cable between the control unit and the drive module is properly connected (V series products only).

2. Replace the drive power module (V series products only).

3. Replace the control unit.

Accelerator pedal voltage out of range fault

 Fault code: 81

 Fault level: 2

 Cause of failure: The current voltage of the accelerator pedal exceeds the setting range;

 Solution:

1. Check the accelerator pedal and related wiring harness;

Oil pump motor power unit temperature sensor failure

 Fault code: 82

 Fault level: 20

 Cause of failure: The temperature of the oil pump motor power module is higher than that of the drive motor power module, and the temperature difference between the two motor power modules exceeds 70°C.

 Solution:

1. Check whether the connection cable between the control unit and the oil pump module is properly connected (V series products only). .

2. Replace the oil pump motor power module (V series products only)

3. Replace the control unit.

Default parameter error

 Fault code: 83

 Fault level: 1

 Cause of failure: There are no default parameters in the flash memory.

 Solution:

1. Reset the controller and power on again.

2. Replace the controller.

Parameter out of limit error

 Fault code: 84

 Fault level: 1

 Cause of failure: The parameter value reading exceeds the normal limit range.

 Solution:

1. Reset the controller and power on again.

2. Replace the controller.

Wrong driving start sequence

 Fault code: 85

 Fault level: 20

 Cause of the fault: When driving, you did not turn on the direction switch first and then press the accelerator pedal.

 Solution:

1. Release the accelerator pedal, activate the direction switch first and then step on the accelerator pedal.

Warning that simultaneous operation of accelerator and lifting is prohibited

 Fault code: 86

 Fault level: 20

 Cause of failure: When the accelerator stroke is greater than the set threshold and the oil pump lifting operation is performed at the same time, the operation is prohibited.

 Solution:

1. Release the lifting rod

2. Modify the threshold or block this function

Inter-module communication interruption failure

 Fault code: 87

 Fault level:

 Cause of failure: The CAN communication line between the traveling and oil pump modules is in poor contact, and there is no data transmission within 6 seconds.

 Solution:

1. Check the CAN communication line between the traveling and oil pump modules.

Oil pump fan control port output overcurrent

 Fault code: 88

 Fault level: 12

 Cause of failure: Internal detection of the controller, the output current of the oil pump fan control port is too large

 Solution:

1. Check the load condition

2. Check the connection harness

3. Replace the controller

Accelerator pedal feedback deviation is too large

 Fault code: 89

 Fault level: 2

 Cause of the fault: The deviation between the two analog quantities of the accelerator pedal is too large and exceeds the threshold.

 Solution:

1. Reset the detection threshold.

2. Check the accelerator pedal.

3. Check the relevant wiring harness.

When starting, the lifting potentiometer is activated

 Fault code: 90

 Fault level: 2

 Cause of the fault: During startup, the lifting potentiometer value exceeded the dead zone value set by the calibration.

 Solution:

1. Release the lifting potentiometer.

2. Recalibrate the dead zone value.

3. Replace the potentiometer

4. Replace the controller

Steering sensor failure

 Fault code: 91

 Fault level: 5

 Cause of failure: The steering sensor feedback voltage exceeds the calibration range.

 Solution:

1. Check whether the steering sensor wiring is correct.

2. If there is no problem with the wiring, recalibrate the clockwise value, intermediate value and counterclockwise value of the steering sensor.

3. Replace the steering sensor and recalibrate it.

4. Replace the control unit.

Accelerator failure

 Fault code: 92

 Fault level: 2

 Cause of the fault: The accelerator pedal feedback voltage value is > the sum of half of the set maximum and minimum difference and the minimum value, but the accelerator pedal switch is not closed at this time.

 Solution:

1. Check the value setting of "Accelerator Pedal Calibration" to see if the minimum and maximum voltage values of the accelerator pedal are set accurately. If not, recalibrate it. You can use the host computer monitoring software to set it.
2. Check whether the control unit and accelerator pedal in the main wiring harness are correctly connected. If there is no problem with the wiring, use the host computer monitoring software to step on the accelerator pedal and observe whether the pedal feedback voltage value is within the correct range.
3. Replace the accelerator pedal.
4. Replace the control unit.

Lifting potentiometer failure

 Fault code: 93

 Fault level: 2

 Cause of the fault: The feedback voltage value of the lifting potentiometer is > the sum of half of the set maximum and minimum difference and the minimum value, and the lifting switch is not closed at this time.

 Solution:

1. Check whether the voltage of the lifting potentiometer exceeds the set value, and you can use the Fanji controller programming tool to recalibrate it.
2. Replace the lifting potentiometer.
3. Replace the control unit.

Oil pump motor temperature sensor short circuit fault

 Fault code: 94

 Fault level: 6

 Cause of the fault: The feedback resistance value of the oil pump motor temperature sensor exceeds the normal range and approaches 0.

 Solution:

1. Check whether the connection between the oil pump motor temperature sensor and the main wiring harness is normal.
2. Replace the oil pump motor temperature sensor.
3. Replace the control unit.

Traction motor temperature sensor short circuit fault

 Fault code: 95

 Fault level: 5

 Cause of the fault: The feedback resistance of the drive motor temperature sensor exceeds the normal range and approaches 0.

 Solution:

1. Check whether the connection between the drive motor temperature sensor and the main wiring harness is normal.
2. Replace the drive motor temperature sensor.
3. Replace the control unit.

Oil pump motor temperature sensor open circuit failure

 Fault code: 96

 Fault level: 6

 Cause of failure: The feedback resistance value of the oil pump motor temperature sensor exceeds the normal range and approaches infinity.

 Solution:

1. Check whether the connection between the oil pump motor temperature sensor and the main wiring harness is normal.
2. Replace the oil pump motor temperature sensor.
3. Replace the control unit.

Traction motor temperature sensor open circuit fault
 Fault code: 97
 Fault level: 5
 Cause of failure: The feedback resistance value of the drive motor temperature sensor exceeds the normal range and approaches infinity.
 Solution:
1. Check whether the connection between the drive motor temperature sensor and the main wiring harness is normal.
2. Replace the drive motor temperature sensor.
3. Replace the control unit.

Capacitor precharge too slow
 Fault code: 98
 Fault level: 1
 Cause of failure: During the power-on self-test process, the voltage of the precharge capacitor increases too slowly.
 Solution:
1. Check whether the connecting cables between the control unit and the two power modules are correctly connected (V series products only).
2. Replace the power modules one by one, excluding the drive and oil pump power modules (V series products only).
3. Replace the control unit.

Interlock switch failure
 Fault code: 99
 Fault level: 2
 Cause of the fault: The interlock switch has dual channels, and the feedback values are not complementary.
 Solution:
1. Check the interlock switch.
2. Check the wiring harness.
3. Replace the control unit.

M1 instrument communication timeout
 Fault code: 100
 Fault level: 2
 Cause of failure: No M1 instrument data was received within unit time.
 Solution:
1. Check M1 meter
2. Check the connection harness.
3. Replace the control unit

CAN bus communication timeout
 Fault code: 101
 Fault level: 2 or 11
 Cause of failure: Communication unit data was not received within the agreed time.
 Solution:
1. Confirm whether the communication unit is lost.
2. Check whether the communication connection between the communication unit and the controller is in good contact.
3. Replace the communication unit.
4. Replace the controller.

Module type error
 Fault code: 102
 Fault level: 1
 Cause of the fault: The wiring

harness currently used by the module is inconsistent with the set module type.
 Solution:
1. Check the wiring harness.
2. Check the module type parameters.

Cell voltage difference fault
 Fault code: 103
 Fault level: 20
 Cause of failure: The voltage difference between the single cells of the lithium battery pack is too large.
 Solution:
1. Check the lithium battery pack.

Battery pack overvoltage fault
 Fault code: 106
 Fault level: 20
 Cause of failure: The voltage of the lithium battery pack is too high.
 Solution:
1. Check the lithium battery pack.

Battery pack high temperature failure
 Fault code: 107
 Fault level: 20
 Cause of failure: The current temperature of the lithium battery pack is too high.
 Solution:
1. Check the lithium battery pack.

Battery pack low temperature failure
 Fault code: 108
 Fault level: 20
 Cause of failure: The current temperature of the lithium battery pack is too low.
 Solution:
1. Check the lithium battery pack.

Single body temperature difference fault
 Fault code: 109
 Fault level: 20
 Cause of failure: The temperature difference between the cells of the lithium battery pack is too large.
 Solution:
1. Check the lithium battery pack.

insulation failure
 Fault code: 110
 Fault level: 20
 Cause of failure: Lithium battery pack insulation failure.
 Solution:
1. Check the lithium battery pack.

Cell voltage difference fault
 Fault code: 113
 Fault level: 11
 Cause of failure: The voltage difference between the single cells of the lithium battery pack is too large.
 Solution:
1. Check the lithium battery pack.

SOC too low fault
 Fault code: 114
 Fault level: 11
 Cause of failure: The current SOC value of the lithium battery pack is too low.
 Solution:
1. Check the lithium battery pack.

Battery pack high temperature failure
 Fault code: 115
 Fault level: 11
 Cause of failure: The current temperature of the lithium battery pack is too high.
 Solution:
1. Check the lithium battery pack.

Battery pack low temperature failure

 Fault code: 116

 Fault level: 11

 Cause of failure: The current temperature of the lithium battery pack is too low.

 Solution:

1. Check the lithium battery pack.

Single body temperature difference fault

 Fault code: 117

 Fault level: 11

 Cause of failure: The temperature difference between the cells of the lithium battery pack is too large.

 Solution:

1. Check the lithium battery pack.

SOC too low fault

 Fault code: 119

 Fault level: 10

 Cause of failure: The current SOC value of the lithium battery pack is too low.

 Solution:

1. Check the lithium battery pack.

Battery pack undervoltage fault

 Fault code: 120

 Fault level: 10

 Cause of failure: The voltage of the lithium battery pack is too low.

 Solution:

1. Check the lithium battery pack.

Single unit undervoltage fault

 Fault code: 124

 Fault level: 1

 Cause of failure: The single cell of the lithium battery pack is under-voltage.

 Solution:

1. Check the lithium battery pack.

Battery pack undervoltage fault

 Fault code: 125

 Fault level: 1

 Cause of failure: The voltage of the lithium battery pack is too low.

 Solution:

1. Check the lithium battery pack.

Battery pack high temperature failure

 Fault code: 126

 Fault level: 1

 Cause of failure: The current temperature of the lithium battery pack is too high.

 Solution:

1. Check the lithium battery pack.

Battery pack low temperature failure

 Fault code: 127

 Fault level: 1

 Cause of failure: The current temperature of the lithium battery pack is too low.

 Solution:

1. Check the lithium battery pack.

Single body temperature difference fault

 Fault code: 128

 Fault level: 1

 Cause of failure: The temperature difference between the cells of the lithium battery pack is too large.

 Solution:

1. Check the lithium battery pack.

Cell voltage difference fault

 Fault code: 129

 Fault level: 1

 Cause of failure: The voltage

difference between the single cells of the lithium battery pack is too large.

 Solution:

1. Check the lithium battery pack.

Single unit overvoltage fault

 Fault code: 131

 Fault level: 1

 Cause of failure: Overvoltage of the single cell of the lithium battery pack.

 Solution:

1. Check the lithium battery pack.

Battery pack overvoltage fault

 Fault code: 132

 Fault level: 1

 Cause of failure: The voltage of the lithium battery pack is too high.

 Solution:

1. Check the lithium battery pack.

Discharge overcurrent fault

 Fault code: 133

 Fault level: 1

 Cause of failure: The discharge current of the lithium battery pack is too large.

 Solution:

1. Check the lithium battery pack.

BMS internal failure

 Fault code: 134

 Fault level: 11

 Cause of failure: Internal failure of the lithium battery pack BMS.

 Solution:

1. Check the lithium battery pack.

BMS internal failure

 Fault code: 135

 Fault level: 1

 Cause of failure: Internal failure of the lithium battery pack BMS.

 Solution:

1. Check the lithium battery pack.

Single unit overvoltage fault

 Fault code: 156

 Fault level: 20

 Cause of failure: Overvoltage of the single cell of the lithium battery pack.

 Solution:

1. Check the lithium battery pack.

Single unit overvoltage fault

 Fault code: 157

 Fault level: 14

 Cause of failure: Overvoltage of the single cell of the lithium battery pack.

 Solution:

1. Check the lithium battery pack.

Single unit undervoltage fault

 Fault code: 158

 Fault level: 20

 Cause of failure: The single cell of the lithium battery pack is under-voltage.

 Solution:

1. Check the lithium battery pack.

Single unit undervoltage fault

 Fault code: 159

 Fault level: 14

 Cause of failure: The single cell of the lithium battery pack is under-voltage.

 Solution:

1. Check the lithium battery pack.

Battery pack overvoltage fault

 Fault code: 161

 Fault level: 14
 Cause of failure: The voltage of the lithium battery pack is too high.
 Solution:
1. Check the lithium battery pack.

Battery pack undervoltage fault
 Fault code: 162
 Fault level: 20
 Cause of failure: The voltage of the lithium battery pack is too low.
 Solution:
1. Check the lithium battery pack.

Discharge overcurrent fault
 Fault code: 166
 Fault level: 20
 Cause of failure: The discharge current of the lithium battery pack is too large.
 Solution:
1. Check the lithium battery pack.

Discharge overcurrent fault
 Fault code: 167
 Fault level: 14
 Cause of failure: The discharge current of the lithium battery pack is too large.
 Solution:
1. Check the lithium battery pack.

SOC too low fault
 Fault code: 170
 Fault level: 20
 Cause of failure: The current SOC value of the lithium battery pack is too low.
 Solution:
1. Check the lithium battery pack.

insulation failure
 Fault code: 172
 Fault level: 14
 Cause of failure: Lithium battery pack insulation failure.
 Solution:
1. Check the lithium battery pack.

insulation failure
 Fault code: 173
 Fault level: 1
 Cause of failure: Lithium battery pack insulation failure.
 Solution:
1. Check the lithium battery pack.

BMS internal failure
 Fault code: 176
 Fault level: 20
 Cause of failure: Internal failure of the lithium battery pack BMS.
 Solution:
1. Check the lithium battery pack.

Battery pack charging current is large
 Fault code: 177
 Fault level: 20
 Cause of failure: The charging current of the lithium battery pack is large.
 Solution:
1. Check the lithium battery pack.

Battery pack charging current is large
 Fault code: 178
 Fault level: 11
 Cause of failure: The charging current of the lithium battery pack is large.
 Solution:
1. Check the lithium battery pack.

Battery pack charging current is large

 Fault code: 179
 Fault level: 1
 Cause of failure: The charging current of the lithium battery pack is large.
 Solution:
1. Check the lithium battery pack.

Lithium battery high voltage interlock failure
 Fault code: 180
 Fault level: 20
 Cause of failure: Lithium battery high-voltage interlock failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery high voltage interlock failure
 Fault code: 181
 Fault level: 11
 Cause of failure: Lithium battery high-voltage interlock failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery high voltage interlock failure
 Fault code: 182
 Fault level: 1
 Cause of failure: Lithium battery high-voltage interlock failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery external communication failure
 Fault code: 183
 Fault level: 20
 Cause of failure: Lithium battery external communication failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery external communication failure
 Fault code: 184
 Fault level: 11
 Cause of failure: Lithium battery external communication failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery external communication failure
 Fault code: 185
 Fault level: 10
 Cause of failure: Lithium battery external communication failure.
 Solution:
1. Check the lithium battery pack.

Lithium battery internal communication failure
 Fault code: 186
 Fault level: 20
 Cause of failure: Internal communication failure of lithium battery.
 Solution:
1. Check the lithium battery pack.

Lithium battery internal communication failure
 Fault code: 187
 Fault level: 11
 Cause of failure: Internal communication failure of lithium battery.
 Solution:
1. Check the lithium battery pack.

External instrument communication timeout
 Fault code: 188
 Fault level: 11
 Cause of failure: No data from the communication unit was received

within the agreed time.

 Solution:

1. Confirm whether the external communication unit is lost.

2. Check whether the communication connection between the communication unit and the electronic control is in good contact.

3. Replace the communication unit

4. Replace the control unit.

Lithium battery internal communication failure

 Fault code: 189

 Fault level: 10

 Cause of failure: Internal communication failure of lithium battery.

 Solution:

1. Check the lithium battery pack.

Main contactor temperature sensor failure

 Fault code: 190

 Fault level: 2

 Cause of failure: Internal detection of the controller, the temperature feedback value of the built-in contactor is abnormal.

 Solution:

1. Replace the controller

Main contactor temperature is too high fault

 Fault code: 191

 Fault level: 2

 Cause of failure: The controller internally detected that the temperature of the built-in contactor was too high.

 Solution:

1. Check the load status

2. Replace the controller

Overspeed warning buzzer port load open circuit

 Fault code: 193

 Fault level: 12

 Cause of failure: The output current of the overspeed warning buzzer port is too small.

 Solution:

1. Check the overspeed warning buzzer port load status.

2. Check the connection harness;

3. Replace the controller;

Parking warning buzzer port output overcurrent

 Fault code: 194

 Fault level: 12

 Cause of the fault: The output current of the parking warning buzzer port is too large.

 Solution:

1. Check the overspeed warning buzzer port load status.

2. Check the connection harness;

3. Replace the controller;

Parking warning buzzer port load open circuit

 Fault code: 195

 Fault level: 12

 Cause of the fault: The output current of the parking warning buzzer port is too small.

 Solution:

1. Check the overspeed warning buzzer port load status.

2. Check the connection harness;

3. Replace the controller;

Brake relay port output overcurrent

 Fault code: 196
 Fault level: 12
 Cause of the fault: The output current of the parking warning buzzer port is too large.
 Solution:
1. Check the overspeed warning buzzer port load status.
2. Check the connection harness;
3. Replace the controller;

Brake relay port load open circuit
 Fault code: 197
 Fault level: 12
 Cause of the fault: The output current of the parking warning buzzer port is too large.
 Solution:
1. Check the overspeed warning buzzer port load status.
2. Check the connection harness;
3. Replace the controller;

Oil pump motor stall (locked rotor) failure
 Fault code: 198
 Fault level: 2
 Cause of failure: The controller has an oil pump speed command, but the actual motor speed is always 0rpm.
 Solution:
1. Check the oil pump motor encoder
2. Check the connection harness
3. Check the oil pump load status
4. Make sure the maximum output current threshold is set appropriately

Communication interruption between dual drive modules
 Fault code: 199
 Fault level: 2
 Cause of failure: Communication interruption between the left and right drive modules of the dual drive
 Solution:
1. Check the communication harness between dual drives;
2. Check whether the module parameter "Drive Motor Type" is set correctly;

Drive resolver disconnected
 Fault code: 220
 Fault level: 1
 Cause of failure: The drive resolver is disconnected or the resolver has interference;
 Solution:
1. Check the drive resolver wiring harness;
2. Use twisted pair shielded wire harness to drive the resolver;

Oil pump resolver disconnected
 Fault code: 221
 Fault level: 1
 Cause of failure: The oil pump resolver is disconnected or the resolver has interference;
 Solution:
1. Check the oil pump resolver wiring harness;
2. The oil pump resolver uses a twisted pair shielded wire harness;

12、Installation of general components

12.1. Installation of multi-way valve

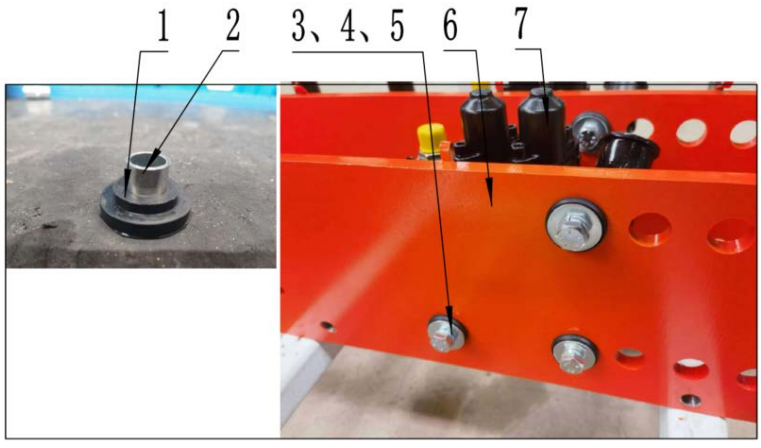
Tools:

Details of equipment, tools, and accessories							
No.	**item**	**Specs**	**Qty.**	**No.**	**item**	**Specs**	**Qty.**
1	sleeve	27mm		7	Open head	27#	1pcs
2	sleeve	24mm		8	Open head	24#	1pcs
3	sleeve	22mm		9	Open head	22#	1pcs
4	Adjustable torque wrench	10-50N.m		10	Electric gun		1pcs
5	Adjustable torque wrench	20-100N.m					
6	Adjustable torque wrench	40-200N.m					

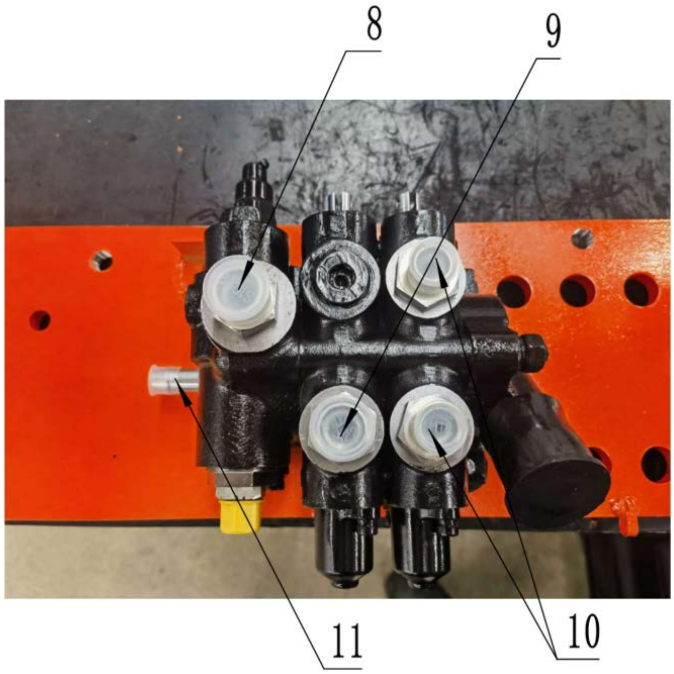
1. Inspection: Make sure the plastic cover of the multi-way valve and the joint plugging cover are intact, the threads of each joint and the O-ring are intact, and there must be no rust. The outer surface of the multi-way valve must not have scratches, color difference, leakage, orange peel, sagging, etc. Defects such as rust, scratches, welding nodules, undercuts, pores, burn-through, spatter, missing welds, uneven welds, etc. must be qualified before installation.

2. Cross beam welding and removal: (6) Cross beam welding is removed from the frame and set aside for use.

3. Multi-way valve installation: (2) Insert the limit sleeve into (1) shock-absorbing pad, put it into the (6) cross beam welding installation hole, place (1) shock-absorbing pad on the opposite side, (7) place the multi-way valve in (1) On the shock-absorbing pad, insert (3) flat pad, (4) spring pad and 5) bolt T=50N.m in sequence and tighten them, marking them well;



4. Installation of the multi-way valve joint: (7) Remove the plug cover of the multi-way valve joint, and remove the (8) oil pipe joint T=110N.m, (9) lifting oil pipe joint T=80N.m, two): (10) The inclined steel pipe joint T=80N.m and (11) the oil return joint T=45N.m are tightened and marked;

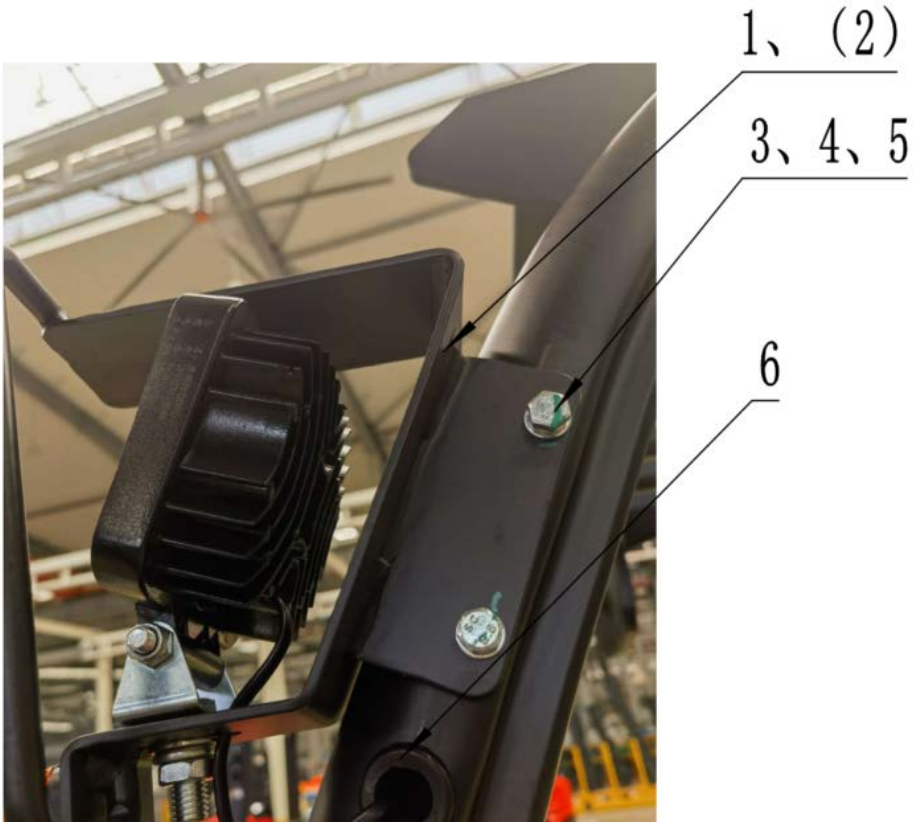


12.2. Installation of lamps

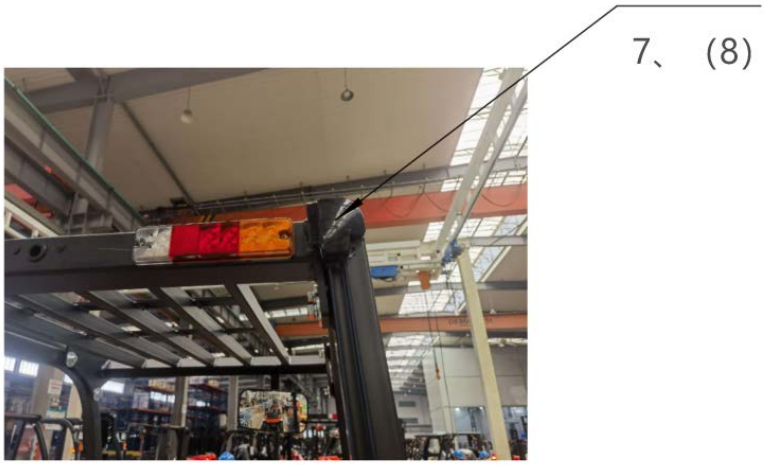
Tools:

No.	item	Specs	Qty.
1	sleeve	14mm	1pcs
2	Electric guns		1pcs

1. Lamp holder installation: Weld (1) left and (2) right lamp holders and place them at the left and right leg installation locations respectively, and tighten them with (5) bolts, (3) spring washers, and (4) flat pads in sequence. Fix it and mark it, and install (6) eye protection rings on the left and right outriggers:



2. Protective cover installation: (7), (8) Protective covers 1 and 2 are installed on the top guard frame



12.3. Tire installation

Tools：

No.	item	Specs	Qty.
1	Wind cannons		1pcs
2	sleeve	30mm	1pcs
3	sleeve	22mm	1pcs
4	Allen Wrench	14#	1pcs

1. Check: there is no bump damage on the tire surface; the tire retaining ring is in a pressed state, and the clearance requirements are consistent and fit;
2. Drive wheel installation: Remove the left and right drive axle nuts and set them aside. Install the (1) tire on the drive axle rim, align the holes, use a tire tightening machine to tighten the tire nuts T=600N.m, and mark them:

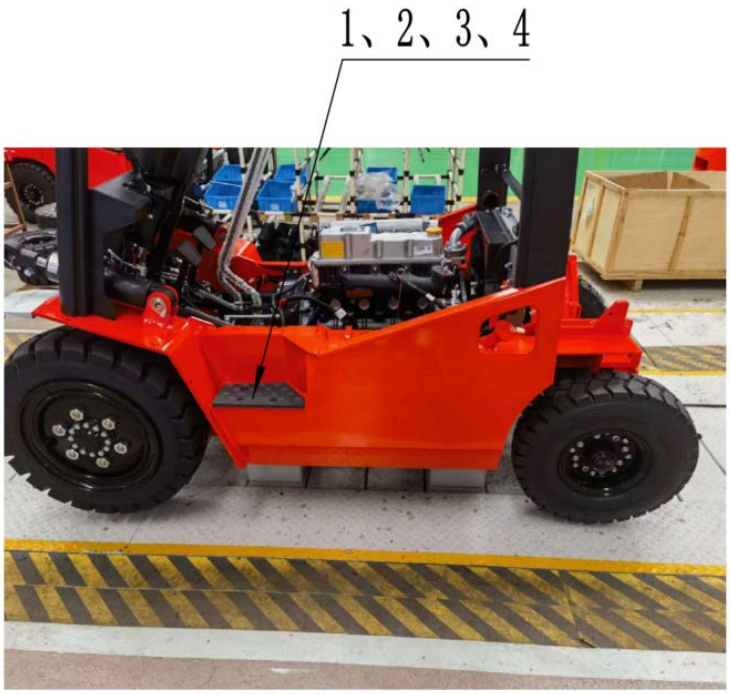
3. Steering wheel installation: Remove the left and right steering axle nuts, install the (2) tires on the steering axle rim, align the holes, use a tire tightening machine to tighten the tire nuts T=200N.m, and mark them:

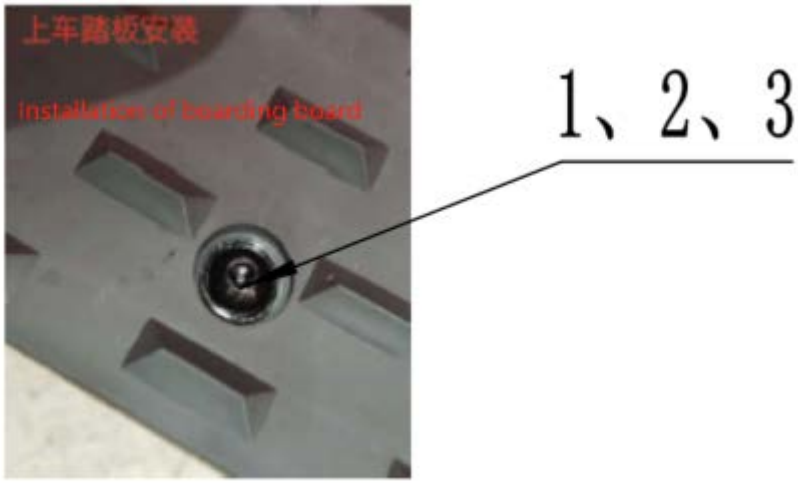
For tire torque values, please refer to this table

Summary of Noblelift internal combustion forklift tire bolt parameters 2024.6.24						
Model	**Drive wheel bolts x qty.**	**Torque value(N.m)**	**Diameter(mm)**	**Steering wheel bolt x qty.**	**Torque value(N.m)**	**Diameter(mm)**
CPC(D)50X	M20x1.5(10.9)x6 S41	700~750	6.3	M20x1.5(10.9)x5 S38	460~550	220
CPC(D)40X	M20x1.5(10.9)x6 S41	600~680	218	M14x1.5(10.9)x8 S22	180~210	160
CPC(D)38	M20x1.5(10.9)x6 S41	600~680	200	M14x1.5(10.9)x8 S22	180~210	160
CPC(D)35	M20x1.5(10.9)x6 S41	600~680	200	M14x1.5(10.9)x8 S22	180~210	160
CPC(D)30	M20x1.5(10.9)x6 S41	600~680	200	M14x1.5(10.9)x8 S22	180~210	160

CPC(D)25	M20x1.5(10.9)x 6 S32	460~550	200	M14x1.5(10.9)x8 S22	180~210	160
CPC(D)20	M20x1.5(10.9)x 6 S32	460~550	200	M14x1.5(10.9)x8 S22	180~210	160
CPC(D)18	M14x1.5(10.9)x 6 S22	180~210	180	M14x1.5(10.9)x6 S22	180~210	125
CPC(D)15	M14x1.5(10.9)x 6 S22	180~210	180	M14x1.5(10.9)x6 S22	180~210	125

4. Pedal installation: Place the pedals (3) and (4) in the fixed installation position of the frame and use hexagonal round head flange nails to fasten and mark them.

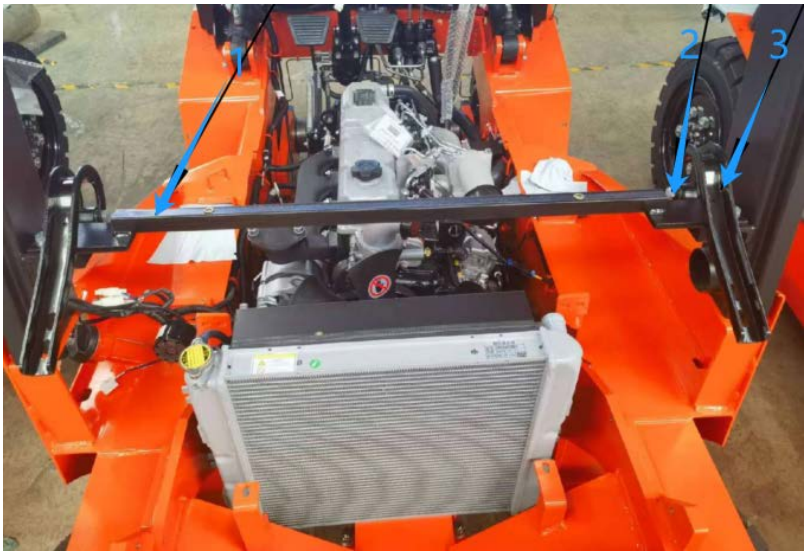




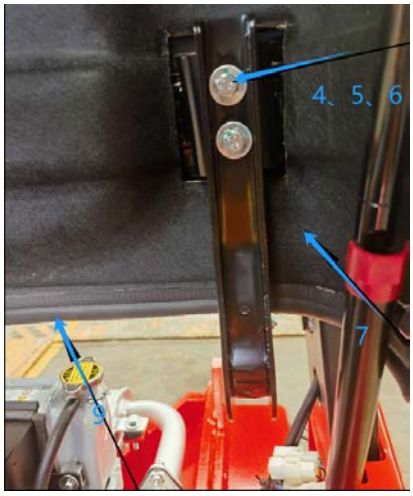
12.4. Hood and seat installation

No.	item	Specs	Qty.
1	sleeve	14mm	1pcs
2	Electric guns		1pcs

1. Inspection: Inspection before installation (7) The surface of the hood shall not be damaged by bumps, etc.; the outer surface of the tie rod welding shall not be scratched, discolored, spray leakage, orange peel, sagging, rust scratches, welding burrs, undercuts, etc. Defects such as pores, burn-through, spatter, missing welds, uneven welds, etc.
2. Fixed installation of the tie rod: (1) Weld the tie rod, place it on the rear leg mounting bracket of the roof guard, align the holes, and insert (4) flat washers, (5) spring washers, and (6) bolts in order to tighten them. Then mark them well.
3. Hinge installation: (2) The hinge sleeve assembly is inserted into (3) the hinge, the hinge assembly is fixed, the bolts are tightened, and then mark them well;



4. Hood installation: (9) The sealing strip is tightly attached around the edge of (7) hood assembly, and (7) the hood assembly is placed in a fixed position of the frame aligned with the hinge mounting hole and inserted into (4) in sequence. Pads, (5) spring washers, (6) bolts are tightened and then mark them well.



5. Gas spring installation: Install the gas spring into the mounting hole at the lower end of the top guard frame, insert the flat washer 8, screw in the M8 lock nut to tighten, and fix

one end on the hood;

12.5 Seat installation:

Tools:

No.	item	Specs	Qty.
1	sleeve	13mm	1pcs
2	electric gun		1pcs
3	open end wrench	13#	1pcs

1. Check: There is no bump or damage on the seat surface, and the model is consistent with the order configuration.

2. Seat installation: (1) Insert the seat bolts into the hood mounting holes, use (4) large washers, flat washers (2), (5) screws, and (2) nuts to tighten and mark them.

3. Installation of the hood lock: install the (6) plastic box on the hood; (6) install the hood lock to a fixed position, tighten and pre-tighten, adjust the lock to the appropriate position, then re-tighten and mark;

4. Installation of refueling cap and refueling mask: Install and place (8) refueling mask and 9) refueling cap in sequence.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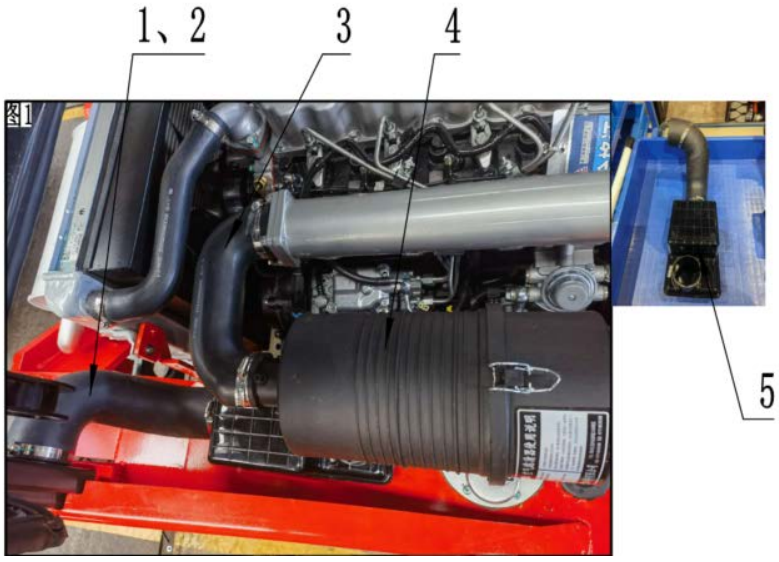
12.6. Air filter installation

Tools:

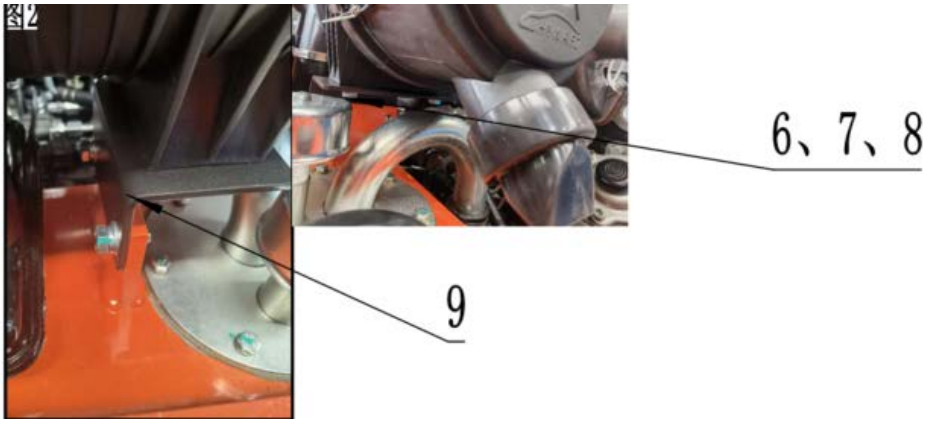
No.	item	Specs	Qty.
1	open end wrench	14#	1pcs
2	Phillips screwdriver		1pcs

1. Inspection: Before installation, check that the models of the air filter and air intake box are correct, and that there are no bumps or damage on the surface;

2. Pre-installation of the air intake muffler: (2) put the throat sleeves into both ends of the (1) air filter intake pipe, install the (1) air filter intake pipe to the (5) air intake muffler, and lock the (2) hose clamp to secure the air filter Insert the interface into the (5) air intake muffler and use (2) hose clamp to tighten it and mark it well;



3. Air filter installation: The (9) bracket is installed at the frame installation position, the air filter assembly is installed on the (9) bracket, and the (6) flat washer, (8) spring washer, and (7) bolts are tightened in sequence. Make good signs;



4. Installation of air intake hose: (1) Pass the air filter air intake pipe to the connection hole of the rear leg of the overhead guard, tighten it with (2) hose clamp, make a mark,

and connect (1) air filter air intake pipe to the engine respectively The air inlet and air filter outlet should be fastened with hose clamps and marked.

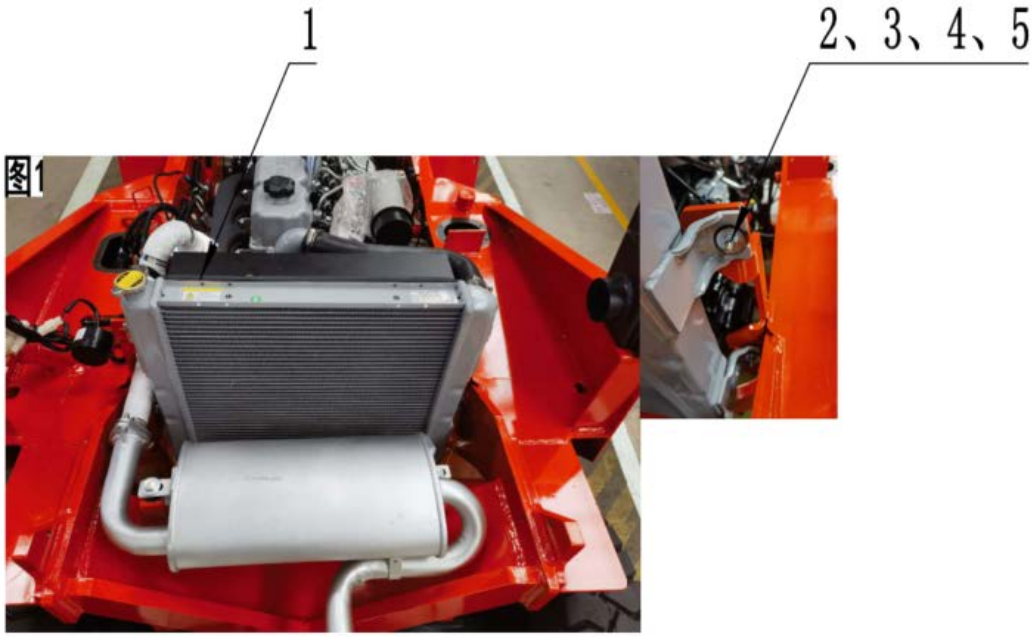
12.7 Installation of radiator assembly

Tools:

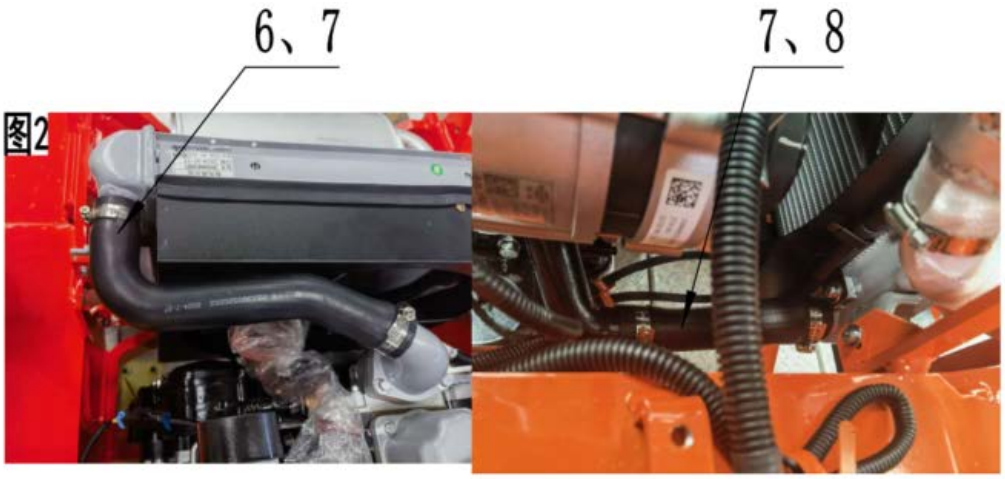
No.	item	Specs	Qty.
1	Phillips screwdriver		1pcs
2	sleeve	10mm	1pcs
3	Electric gun		1pcs

1. Inspection: Check that the radiator assembly and muffler model match the model model correctly, and that there are no bumps on the surface;

2. Installation of radiator assembly: (1) Place the radiator assembly in the fixed position of the frame and align it with the holes, then insert (5) shock absorber, (2) large washer, (3) elastic washer, (4) in order Tighten the bolts and mark them



3. Radiator assembly water pipe connection: Put (7) hose clamps on both ends of the upper and lower water pipes of the radiator (6) and (8), connect them to the upper and lower water outlets of the engine, tighten them, and mark them:



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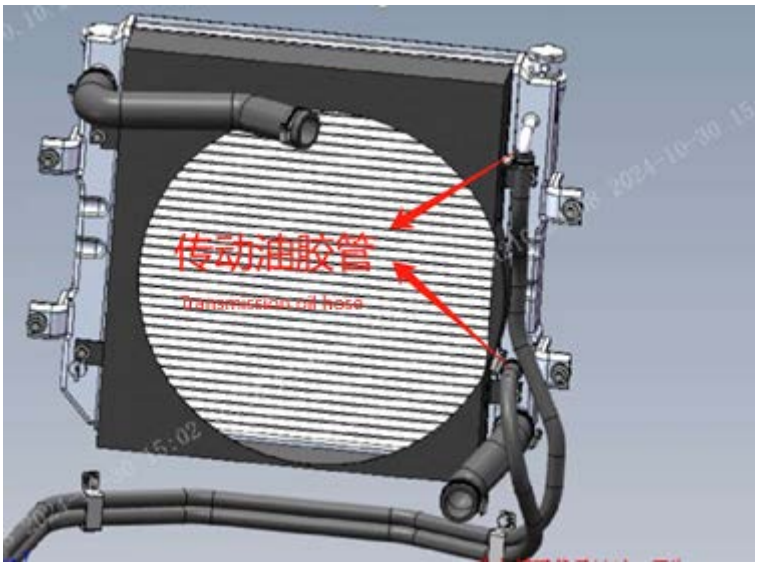
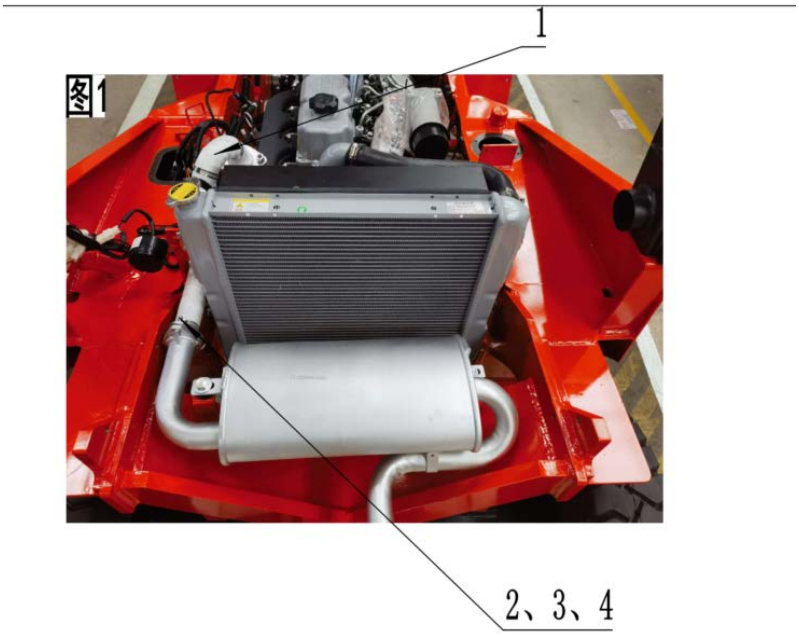
4. Antifreeze hose connection (hydraulic): (7) Put the antifreeze hose into the throat, connect it to the connection port of the radiator, tighten it, and mark it;



5. Exhaust pipe installation: (9) The muffler is pre-placed on the frame, (1) the front end of the exhaust pipe assembly is fixedly installed on the exhaust pipe of the engine, the rear end is connected to the (9) muffler, and the (1) exhaust pipe assembly is inserted into the 2) spring washer, (3) flat washer, (4) bolt tightening



6. Fixed installation of the muffler: (9) Align the muffler holes with the frame supports, and insert (5) shock absorbing pads, (7) large washers, (2) spring washers, (6) bolts (8) nuts in order , tighten and mark,